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NOTES ON THE PLAGUE IN CHINA AND INDIA.*

By Joseph Marshall Flint, *The Johns Hopkins University.*

Aside from the recent outbreaks of Bubonic Plague which have attracted such widespread interest in themselves, there is something in the historical associations of the disease that has lent to them an added interest. Probably no other medical subject has been so extensively used for literary material as the Pest, for the dramatic and harrowing episodes of the great epidemics have afforded ideal material for descriptive writers who have availed themselves of its riches again and again. Thus Boccaccio, Defoe, Gibbon, Hodge, and others† have described the havoc it played in Europe when it was known as the Black Death. Accordingly, when, with the Philippine Commission, in Hong-Kong and later in India we had an opportunity of seeing the disease, it was evident that the facts of its epidemiology and environment were quite as interesting and certainly more dramatic than the clinical and pathological features of the disease itself.

The last recorded epidemic of note was that which occurred in Egypt in about 1825, and from that time to the outbreak in Hong-Kong, the disease has been endemic in the central portion of China. Not much attention was paid to it, however, until Hopper‡ noted its existence in Yunnan. He says: "Despite of such a favorable climate, Méng-tzŭ, in common with other parts of Yunnan, has suffered annually for a period of years from the plague, a kind of malignant fever, fatal in a few days, having as one of its symptoms a hard swelling in the neck, in the armpits, or in the groin, which has carried off a number of its inhabitants. On approach of the epidemic, the first victims are rats, which, fearless of human beings rush madly into their presence, and after capering around the room fall dead at their feet." From Yunnan the disease traveled to Pakhoi by one of the common trade routes, where according to Lowry and Horder, it has been endemic for over twenty years. In 1891, it broke out in Kao-chao, later in towns situated on the West River, and finally in 1894, a severe outbreak occurred lower down in Canton. Now, the infection of Hong-Kong proceeded either from Pakhoi or Canton; but inasmuch as Pakhoi is more than three times as far from Hong-Kong as Canton, and the Hong-Kong commerce with the latter port is hundredsof times greater than that with the former, it is probable that Canton was the source of contagion. Supporting this view is the following significant fact: On the second of March, 1894, a large Chinese procession was held in Hong-Kong, which was attended by over 40,000 Cantonese coolies of the lower class.

*I wish to express my indebtedness to Prof. Simon Flexner and to Prof. L. F. Barker for permission to report these notes on the plague which were made while the Philippine Commission was on its trip.

†Boccaccio: The Decameron. Introduction. Defoe: The Journal of the Plague Year. Defoe: Due Preparation for the Plague. Hodge: Loimologia. Vincent: God's Terrible Voice in the City. Boghurst: Loimographia. Pepys: Diary. June 7th, 1665, to Jan. 19th, 1666.

‡Imperial Maritime Customs, Annual Report, 1889.

At this period, tens of thousands were dying of the plague in Canton, and accordingly it is not improbable that the Island of Hong-Kong was inoculated then.

The first cases appeared in the district of Tai-ping-shan where the sanitary conditions are worse than in any other part of the city. (Properly speaking the city is called Victoria and the island Hong-Kong, but the latter name is now commonly used for the city as well.) In the native and European quarters of the city, Hong-Kong presents a strange contrast, for the European districts, from a sanitary point of view, are probably unexcelled in any city in the Orient; but the native quarter, notwithstanding some fairly broad, clean streets and new buildings, is really a whitened sepulchre. Here, in the tenements and side alleys, the coolies live in indescribable filth; the segregation and overcrowding being so great that at night the overflow sleeps in the streets. Many of these in the native districts are so narrow that one walking with outstretched arms can almost touch the buildings on opposite sides of the road. The houses are three or four stories high and originally contained fairly large-sized rooms. The Chinaman, however, with his naturally frugal mind, subdivides them by cheap wooden partitions, and makes four rooms for one. With the decrease in the size of the rooms goes an increase in the number of their occupants, so that in one poorly ventilated tenement from 30 to 40 natives are huddled together, with less than 150 cubic feet of air-space per capita. As yet the coolie has not learned even the rudiments of personal hygiene, and the Chinese enjoy the unenviable distinction of being one of the filthiest peoples on the face of the earth. Apropos of this trait, some one has fitly called them practical Malthusians. One day in Hong-Kong we counted 14 coolies pulling and pushing a meat-cart that could have been drawn easily by a single horse; so, in a country where man and the horse show in a commercial ratio of 14 to 1, little in the way of civilization or personal æsthetics can be expected. As a rule the common coolie never cleans either himself or his houses.

In speaking of these questions Lowson* says: "At the beginning of the outbreak a majority of the houses were in filthy condition. When to a mixture of dust, old rags, ashes, broken crockery, moist surface soil, etc., is added fæcal matter, and the decomposing urine of animals and human beings, a terribly unsanitary condition of affairs prevails; and that this is no overdrawn picture of what was to be met with in Tai-ping-shan, many Europeans now know to their cost." One must recall, moreover, that Hong-Kong is Europeanized China, and that the conditions prevailing there do not compare with those found in Canton, for example—a typical Chinese city like those in other parts of the celestial Empire. Indeed, in comparing it with Canton, there is something almost Utopic about the sanitary condition of the native quarters of Hong-Kong.

Once begun, the epidemic was fought by the following general sanitary measures: (1) Removal of the sick and dead. (2) Temporary segregation of those exposed while the premises were being disinfected. (3) Cleansing and disinfecting of "infected premises." (4) Disinfection of clothing. (5) General cleansing and limewashing of all tenement houses. (6) House-to-house visitation. (7) Disinfection of public latrines. These measures were all carried out with a considerable degree of success—much more success than attended the similar ones established later in India. This is due partly to the fact that the Chinaman is more easily bullied by sight of power than the Hindu, and partly because the customs offended by the plague regulations are, in China, for the most part merely personal and are neither national nor religious.

During the height of the epidemic the medical staff had more to do than it could accomplish, but by the aid of a number of British soldiers, especially assigned to plague duty, managed to keep up the routine work necessitated by the sanitary plague regulations. In this work the greatest opposition came from the unwillingness of the Chinese to send patients into the hospitals and the resistance they made to house-to-house inspection. In the secretion of cases, moreover, they often went to unheard-of extremes, and the district inspectors in their search for patients often saw sights that it seems almost impossible to believe. Dr. Lowson says, for example: "To overpaint the pitiable surroundings associated with plague work at the commencement of the epidemic would be impossible. I have entered a long, low cellar, without any window opening, and with air entering only by a square open shaft from the level of the roof three or four stories high. Down one side of the shaft ran a broken earthenware drain-pipe, leaking freely, the contents streaming down the wall of the air-shaft to a shallow pool of filth which crossed the undrained floor of earth. Although it was broad daylight outside, a lantern was necessary to see one's way. On a miserable sodden matting, soaked with abominations, there were four forms stretched out. One was dead, the tongue black and protruding. The next had the muscular twitchings and a semi-comatose condition heralding dissolution. In searching for a bubo we found a huge mass of glands extending from Poupart's ligament to the knee-joint. This patient was beyond the stage of wild delirium. Sordes covered the teeth and were visible between the blackened and parted lips. Another sufferer, a female child about 10 years old, lay in the accumulated filth of apparently two or three days, unable to speak owing to the presence of enlarged cervical glands. The fourth was wildly delirious and was constantly vomiting. The attendant —the grandmother of the child—had a temperature of 103° F. and could only crawl from one end of the cellar to the other. She was wet through and was herself doomed. This is no fancy sketch but a true picture of how we found some of the patients at the outbreak of the scourge in Hong-Kong. No one unfamiliar with the horrors of the coolie accommodations in China, could credit how the poor live in Hong-Kong, or could imagine how the horrors of their everyday life were intensified by the plague." In disinfecting some infected premises one day Dr. Lowson told us that in one room the inspectors were forced to dig through two feet of dirt and human excreta to reach the floor.

The mortality from plague in Hong-Kong among the Chinese varies between 91 and 93 per cent, so that almost all of those afflicted, no matter what their treatment, die. Naturally, in view of these facts it is not astonishing that the

*Lowson: J. The Epidemic of Bubonic Plague in 1894. Medical Report, Hong-Kong, 1895.

coolies rebel against sending their sick into the hospitals, for there the tremendous mortality is emphasized much more than it would be in cases that remained at home. Both in the Tung-Wah Hospital and Kennedytown Hospital for infectious diseases, wards are set aside where those who elect may receive native treatment. Of course, this practically amounts to a recognition of the quackery of the Chinese doctors on the part of the government, which thus officially assumes the responsibility for their treatment. This practice is now being strenuously opposed by the Colonial medical men.

During our visit to Hong-Kong, the plague was quiescent and there were only from 16 to 20 deaths a day from the disease. The house to house visitation at this time had been given up, so that the majority of these cases were found dead on the streets and were carried by the inspectors to the mortuary. On entering the morgue each morning the sight was a ghastly one, for the bodies were lying about on the

DR. JAMES A. LOWSON, CHIEF PLAGUE OFFICER AT HONG-KONG, IN FRONT OF THE KENNEDYTOWN HOSPITAL.

tables waiting until the hasty autopsies, necessary for burial, could be performed. Many that had not been discovered promptly were fly-blown, while other cadavera that had for several days been lying undiscovered in obscure places were half-eaten by maggots before they were carried to the mortuary. The disposal of cases that die after successfully eluding the vigilance of the district inspectors is facilitated by the habit which the coolies have of sleeping on the streets during warm nights. In Hong-Kong, during the hot season, night shows many weird and picturesque sights. The little narrow streets in the native quarters, lighted dimly by the flickering street-lamps are simply covered by the sleeping coolies who are drawn from the crowded and poorly ventilated houses by the stifling heat. They are so crowded that one cannot walk for any distance without stumbling over the half-naked sleepers who lie stretched out on little pieces of matting. So when a secreted plague patient dies, he is carried out by relatives and laid in the street among the sleeping forms. Most of these rise at dawn to go to work, and those that do not are usually taken later to the mortuary by the plague inspectors.

The mortuary is situated half-way up the hill on the outskirts of the city toward Canton, and consists of a modern deadhouse, an office for the government medical officer, and quarters for the native care-taker. The first striking thing about the plague bodies was the presence on many of two parallel rows of deep purple spots about the size of a Spanish dollar extending from the sides of the neck down on to the chest. At first sight these appeared to be a new manifestation of the disease until Dr. Lowson told us that these purpuric spots were the result of the Chinese method of counter-irritation. This consists in firmly pinching the skin between the thumb and forefinger until it is bruised. As there is, in plague, a general tendency to hemorrhagic extravasation into the skin and serous membranes, the blood oozing from the torn vessels into these traumatic areas soon turns black, and gives the appearance which we first noted. Mosquito and flea bites behave in much the same manner. Likewise the slightest scratch or

SMALLPOX WARD AT THE KENNEDYTOWN HOSPITAL.

bruising of the skin is apparently always followed by a pink blush, and later by a subcutaneous hemorrhage which soon changes to a dark purple-colored spot. In many cases we observed extensive bullæ filled with blood-stained serum, and in one or two instances the idiopathic hypodermic hemorrhages which gave the disease its mediæval name of the Black Death.

The main plague hospital in Hong-Kong is now at the old Kennedytown Barracks, in the extreme outskirts of the city, which have been converted into a hospital for infectious diseases. Here principally plague and smallpox cases are received. The hospital occupies a commanding position at the foot of Mount Austin, from the base of which the grounds extend to the water's edge. The main building, a substantial stone structure overlooking the mouth of the West River towards Kowloon, is covered by stucco, and contains the laboratory, offices and a few wards. The major part of the hospital, however, consists of rude matsheds made of palm-thatched walls and roof stretched over bamboo frames. They have rough board floors, and are lined by coarse matting. On the whole they make a fairly hygienic hospital, except that thorough disinfection of the wards is impossible. A few

supported on piles over the water's edge are perhaps more sanitary than the rest, because they get air and sunlight in greater abundance. As a rule these wards are large enough for four or five patients, their small size being a decided advantage, as convalescents and those in the early stages of the disease are thus kept from witnessing the depressing scenes

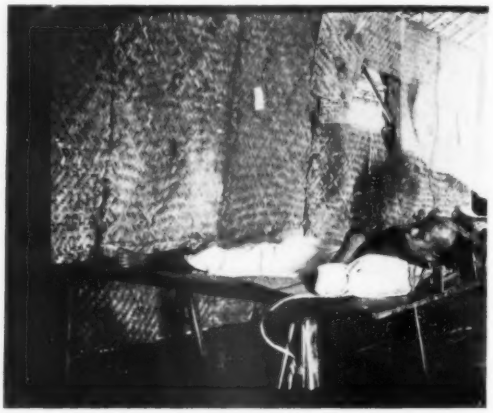
A ROW OF PLAGUE WARDS IN THE KENNEDYTOWN HOSPITAL.

that often occur when patients are in the delirious stages of the malady. Plague patients do not have beds or cots but lie on a platform made of boards, supported by ordinary carpenter's horses, over which is spread a small oblong piece of matting. They have no bedding, and their heads rest on the peculiar Chinese pillows which look more like bamboo rat-traps than

MATSHEDS AT THE KENNEDYTOWN HOSPITAL, WHERE NATIVE TREATMENT IS GIVEN.

anything else. When patients get in the maniacal delirium that often accompanies the acute stage of the disease, they are tied down on their rough litters by cloth thongs. A patient so controlled can be seen in the accompanying photograph. In the male wards there are coolie attendants while the women are nursed by amahs. Besides the Kennedytown Hospital, there were during the days when the epidemic was at its height several other temporary hospitals established in the city, and a floating hulk, the Hygeia, nicely fitted up and anchored off the Kennedytown Hospital, was used for European and Japanese patients. Aoyama, the Japanese physician who was infected from an autopsy wound, was treated on this ship.

Epidemics begin in the bubonic form, and when the epidemic is at its height and the mortality is greatest, changes to pneumonic plague, and finally in the defervescent stage dies off again in the bubonic type. This has occurred regularly in Hong-Kong, and has been noted in the many epidemics that have occurred in India by the plague authorities there. Atmospheric conditions do not seem to have much influence on the disease, except that during the rains, people are driven into the crowded, dirty houses, where they are more exposed to infection; and the bacilli, moreover, are protected under these circumstances from the dessicating and bactericidal action of the sun's rays. This, Kitasato has shown, is one of the most potent agents in the destruction of the plague bacillus,



PLAGUE PATIENT UNDER RESTRAINT IN THE HONG-KONG PLAGUE HOSPITAL.

exposure for an hour usually being quite sufficient in temperate climates to destroy the germ. Epidemics are usually heralded, by a great mortality among the rats, which seem, when affected with plague, to lose all fear of human beings and run boldly about the houses. In part, at least, the infection of the rats can be accounted for by the ingestion of septic material, *i. e.*, sputum and dejecta of plague patients, but by far the most prolific cause of its spread is by fleas. It is well known that fleas soon leave the bodies of rats dead of the plague, and it is supposed get on to other healthy uninfected rats. The agency of these insects as transporters of the disease has been shown by Simond* and by Lowson who put fleas from plague rats on healthy rodents, and found that they died of the disease in about three days. Flies and mosquitoes, however, do not seem to play such an important rôle in the transmission of plague to human beings, for both infest the wooded area about the Kennedytown Hospital, and yet no one of the attendants there

*Simond: "Propagation de la peste" Annales de l'Institut Pasteur, Oct., 1898.

was ever infected. By far the most important atria of infection for human beings are through abrasions of the skin, through the mucous membranes of the respiratory tract, and to a lesser degree through the alimentary tract. Plague, like any infectious disease, thrives where sanitary conditions are poor; and in China and India finds naturally ideal conditions for its spread among the hordes of natives whose lives of misery and squalor form the dark side of the human picture in the Far East.

The symptoms and bacteriology of the pest have already been well described in the translations of the papers of KITASATO and AOYAMA which appeared in this journal some years ago* so reference will be made only to some of the more important points which were brought to our attention in India and China. It appears that the disease may exist in any of its forms alone, or two or even more may simultaneously complicate each other in the same patient. In the simple bubonic type the location of the bubo indicates that the portal of entry of the infection occurred in the area drained by that set of lymph-glands, but it is also not uncommon to find glands enlarged *en échelon*. Thus, in one of our Hong-Kong autopsies the femoral, inguinal, iliac and lumbar groups were all enlarged and hemorrhagic. From the observations made at the Arthur Roads Hospital in Bombay, based upon the study of a large number of cases, the site of the buboes occurred as follows:

Femoral,	32.12	per cent.
Femoro-inguinal,	23.36	" "
Axillary,	16.35	" "
Inguinal,	12.38	" "
Cervical,	5.25	" "
Multiple,	4.67	" "
Total	94.13	" "

The frequency with which the buboes occur in the lower sets of lymph-glands is explained by the fact that both in India and China, natives of the lower classes go barefoot. But in this connection it is worthy of note that all of the men in the Shropshire segment in Hong-Kong who were attacked with the plague while on inspection duty had femoral or inguinal buboes, even though they were well-booted. Their trousers, however, were open at the bottom, admitting dust particles laden with plague bacilli. While on similar duty in India, the soldiers always wore puttees, and not a single case was reported among them.

In most cases the buboes are exquisitely tender and generally require local applications to relieve the pain. For this purpose the ice-bag has been used with good effect in India. Between the portal of entry and the enlarged glands, there is often a well-marked lymphangitis and at different points multiple lymphatic abscesses may occur. This was particularly marked in Aoyama's case. When we met him in Japan, he showed us the scars of the numerous incisions made to relieve the condition about which there was a slight tendency to the formation of keloid. This has been repeatedly observed in Hong-Kong among the Chinese who have recovered after a complication of suppurating buboes or lymphatic abscesses. Most of the buboes do not suppurate, but the fact that the great majority of cases die within two or three days after the onset undoubtedly bears a relation on this point. Likewise, it seems that mixed infections have a very important influence on the question of suppuration as the following figures show. In the pus of 29 suppurating buboes examined by the several continental commissions working in Bombay, the following results were obtained:

Bacillus pestis,	8
Staphylococci,	9
Streptococci,	5
Sterile,	7
Total,	29

A suppurating plague bubo forms a most indolent ulcer and the granulations at the base sprout with such reluctance that it may take months for them to heal. Fortunately in these old chronic ulcerations the pus is usually sterile. In one case in Hong-Kong, followed by recovery, the femoral vessels lay exposed in the base of a large slough about a suppurating bubo.

The incubation period in plague varies between three and nine days, but in the majority of cases averages about five or six. It seems that there are no constant prodromata, and the onset, as a rule, is sudden, marked by headache, fever, backache, and a general feeling of malaise. Vomiting of a blood-stained fluid has been observed not infrequently at the onset, a phenomenon due to the action of the plague toxin in the mucous membrane of the stomach which, at autopsy, is nearly always injected and ecchymotic. In Hong-Kong, they were in the habit of speaking of the plague facies, which Lowson believes is often of assistance in the diagnosis of the disease. It consists of a mixture of anxiety, cyanosis, and dyspnœa, and in mentioning it Lowson says: "Generally speaking, there is something indescribable in the face of the plague-stricken which seems to help your diagnosis—an expression as if the sufferer himself knew all about it, and his inner consciousness had left its mark upon his features." There is something quite characteristic about the plague tongue, which has a heavier coating than in typhoid fever and is considerably clearer about the margins. Soon the coating turns black and sordes often cover the teeth and lips. After the onset the fever usually rises rapidly and reaches its maximum in from 12 to 24 hours. The common temperature ranges from 103° to 105° F., but cases with a fever as high as 108° are not infrequently observed.

The patient soon after the onset shows evidence of great prostration. The pulse, at first, is full and bounding, and later becomes feeble and collapsed. Dicrotism is very common, and the heart, in the majority of cases, needs repeated stimulation to overcome the cyanosis. The cardiac symptoms observed clinically in plague cases conform in general to the results obtained experimentally by the injection of the toxic nucleoprotein of the Pest bacillus into animals. Lustig and Galeotti have also shown† that the subcutaneous injection of

* Flexner: Bulletin of The Johns Hopkins Hospital, Vol. VII, Oct., 1896.

—— Bulletin of The Johns Hopkins Hospital, Vol. V, Oct., 1894.

† Lustig and Galeotti: Lo Sperimentale, 1898.

large amounts of the plague toxin into animals is followed by a local thrombosis at the point of inoculation, and that the blood-pressure in dogs falls rapidly to 10-15 mm. of mercury, accompanied by a progressive diminution in the force and rhythm of the heart-beats soon resulting in death.

On the second or third day, the cerebral symptoms usually appear: these consist of a general apathetic condition on the part of the patient, coma or delirium of varying degrees. During this period it is often difficult to get the patients to take nourishment, and the attendants must resort to strategy or rectal feeding. This was notably the case with Doctor Aoyama, who could only be tricked into taking nourishing draughts by appealing to his politeness, on the one hand, and his patriotism on the other, by alternately toasting Queen Victoria and the Mikado in champagne, milk and other nourishing and stimulating beverages. During this period of the

ONE OF THE PLAGUE STREETS, POONA.

disease symptoms of meningeal involvement and cerebral hemorrhages were sometimes observed.

The respiratory symptoms in most cases consisted of a marked hypostasis owing to the marked cardiac weakness; but when the pneumonic type of plague was present, the condition was more often of a lobular type. In uncomplicated cases the plague bacillus can be found in the sputum, but oftentimes there is present a mixed infection with the pneumococcus. Œdema of the glottis and extensive laryngitis were also found in some of the Bombay cases. During the course of the disease, as well as at the onset, vomiting occurs and the vomitus in such cases is stained with both bile and blood. The spleen is palpable and remains so during the course of the disease. There is always some albumin in the urine, but it is small in amount; likewise casts, epithelial débris, and occasionally Plague bacilli are also found. In general the disease runs its course in five or six days, but the fever may remain elevated for weeks especially in cases where there is a secondary pyæmic infection. Death in most cases occurs from heart failure. No cases of reinfection above suspicion have been reported, but relapses are not uncommon during convalescence and result usually from local extension from the original focus of the disease.

Between the plague in China and India there are many points of difference which depend, it seems, partly on the character of the natives. In China the pest is more fatal than it is in India, the death-rate among the Chinese being 93 per cent, and only about 82 per cent among the low-caste Hindus, who are the heaviest sufferers from the disease in India. The general standards of life and personal hygiene are much lower among the Chinese than they are among the Hindus; but for some reason the epidemics are so much greater in India that the terrible effects of the disease are more obvious and its many horrors are impressed on the observer by the magnitude of the sufferings of the natives. Since the first outbreak in India, in 1896-7, the death-rate has constantly increased each year, until, in 1899, more than 50,000 people died of plague in the City of Bombay alone. Moreover, the disease has now spread in a

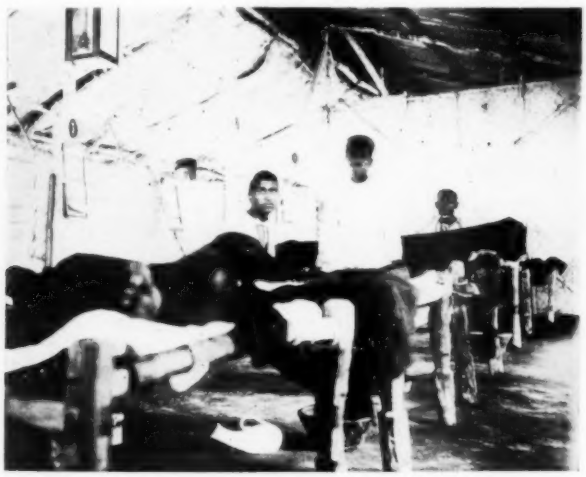
PLAGUE FUNERAL IN INDIA.

large part of India and has appeared in Bengal, Madras and many points in the Bombay Presidency. The really serious part of the question is that apparently it is still on the increase, and precisely what the end will be no one at present can foretell. The Colonial Government, however, is doing all in its power to stamp out the disease, and no experiment is left untried that offers the slightest hope of solving this very serious question.

The plague measures in India are much like those in Hong-Kong except that they are, perhaps, not quite so thorough. In India the plague authorities have had to fight against the bigotry, opposition and animosity of the native who gives far more trouble to the sanitary authorities than his celestial neighbor. Here exist the ideal conditions for the spread of any disease; namely, overpopulation, overcrowding, malnutrition, unhealthy environment and crude and unclean methods of living. Under these conditions the energy required to fight the plague in India has been tremendous because of the inertia of the vast population, which even looked with disfavor on the measures meant for its good. In Bombay alone, the plague

expenses for the first year of the epidemic amounted to over fifteen lakhs of rupees.

Certain facts concerning the plague epidemics of India have been more fully described in another place;* but the methods of treatment employed in India and the results obtained in their use are of the greatest importance. No effort or expense has been spared by the Indian government to try any method that offers any hope of relieving the distressing conditions. To this end, the Bombay Presidency has fitted up the old government house at Parel as a plague laboratory, and here the plague prophylactic of Haffkine and Lustig's *Heilserum* are manufactured. Yersin, it appears, was the first to manufacture a serum supposed to act as an antitoxin to the poisons produced by the plague bacillus. Like the diphtheria antitoxin it was made on the assumption that the plague toxins were soluble products of the growth of the pest bacillus and could be obtained from filtered fluid cultures of the organism. The first cases treated by the antitoxin were in China and the results, it is stated, were very satisfactory. Somewhat later



WARD IN POONA PLAGUE HOSPITAL. THE PATIENT COVERED WITH A BLANKET IS DEAD.

several plague patients at the Arthur Roads Hospital in Bombay were inoculated with the antitoxin, but the results were practically negative; so, from lack of both results and material, further experiments with Yersin's serum were not undertaken. In the Oporto epidemic Calmette† used Yersin's serum and reports excellent results with it. Two facts, however, should be noted, *i. e.*, that the number of cases treated in India was too small to allow any conclusions as to the real value of the antitoxin as a therapeutic agent to be drawn, and, on the other hand, that the cases occurring in Portugal were by no means as severe or fatal as those among the natives of Bombay.

Then some time later Haffkine,‡ making experiments along the same line reported to the health commissioner that his efforts to obtain an antitoxin for plague by methods similar to those used by Behring, Kitasato and Roux for diphtheria were unsuccessful and that his experiments resulted negatively. At a later period Lustig and Galeotti§ had a similar experience, but they found, however, that the essential toxin was situated in the body of the plague organism and was of the nature of a "*nucleoprotein toxique.*" They succeeded in isolating this toxin by the following method: A three days' growth of the plague bacillus on large agar plates is scraped off and dissolved in 1 per cent KOH. This solution is filtered and acidulated with dilute acetic acid, whereupon it yields an abundant white precipitate which is washed and dried and in this state can be kept indefinitely. It is prepared for use by dissolving in a dilute solution of sodium bicarbonate [0.5 per cent]. This *nucleoprotein toxique*‖ is soluble in alkalis and insoluble in dilute acids. In general it gives the proteid reactions and by artificial digestion can be split up into peptone and an insoluble nuclein. When injected experimentally it produces the symp-

LOW-CASTE HINDU DEAD, POONA MORTUARY.

toms which we have already described. It is from this *nucleoprotein toxique* that the antitoxin is manufactured by injecting it into a horse. The quantity used naturally depends a good deal on the condition and strength of the animal. The injection is followed by a violent reaction at the site of inoculation; an area of localized œdema half as large as a man's head may persist at the point of inoculation for many days. We saw that condition in one of the horses at the Parel Laboratory in Bombay. These large injections are repeated as often as the condition of the horse permits until the required degree of immunity is produced. Then the serum is withdrawn and prepared in the usual way. As yet the number of antitoxic units has not been determined by animal titration, and the preparation of the serum in large quantities has only just begun. The complete reported results thus far include 175 inoculations, with 100 deaths, and 75 recoveries, or a mortality of 57.30 per

* Barker and Flint. "A Visit to the Plague Districts of India." New York Medical Journal, Feb., 1900.

† Calmette: Presse Médicale, 1899.

‡ Report on the Outbreak of Bubonic Plague, 1896-97. Bombay, 1897.

§ Lustig and Galeotti: Lo Sperimentale, 1898.

‖ Galeotti: Arch. des Sciences Biologiques. Tome VIII, 1899.

cent. Thus, the mortality for plague averages about 73.70, so that, at present, the serum saves about 16 per cent of the cases. In these inoculations the cases were not selected but were taken as they came, and included 18 in which dissolution was imminent. After the injection a hypothermic action was noted which seems in plague cases to be a specific reaction, as it was never obtained when people who were not suffering with plague were inoculated. At times considerable prostration seemed to follow the injection and a slight increase in the cardiac weakness so that caffein, camphor or ether were often given with the antitoxin. After the second injection there was an amelioration of the conditions. The antitoxin, according to Galeotti, acts in a manner exactly opposite to the *nucleoprotein toxique*. The pulse becomes less frequent and the dicrotism disappears; there is an augmentation in the force of the heartbeat, while the buboes, at the same time, become less painful, and any tendency to suppuration is arrested. Bacilli, moreover, tend to disappear from the blood. In pneumonic cases and in the severer gastro-intestinal infections, the antitoxin in its present strength apparently has no effect.

CHILD DEAD OF PLAGUE, POONA MORTUARY. PREPARATION FOR FUNERAL.

Soon after the outbreak of plague in India M. Haffkine, formerly of the Pasteur Institute, who had been at work in India on some problems concerning cholera, began the preparation of a prophylactic against plague.* The principle involved in the preparation of that fluid is similar to that followed by Lustig somewhat later in the manufacture of his *Heilserum*; namely, that the plague toxin resides in the body of the pest bacillus, and cannot be obtained from the soluble products of its growth. The preparation of the Haffkine prophylactic fluid is now carried on, on a large scale, in Bombay; and it is shipped all over India and to many other parts of the world. At present the prophylactic meets with great opposition from the natives, especially the Hindus, who will not submit to inoculation because the fluid contains meat, and thus offends one of their most cherished religious principles. To meet this objection an effort is being made to procure a medium on which to grow the organisms from a substratum gluten and other substances free from meat extracts.

The manufacture of the prophylactic is quite simple, and through the kindness of Dr. Melne, who had charge of the Parel Laboratory in Haffkine's absence, we were able to follow the prophylactic through the various stages of its preparation. A kilogram of finely chopped goat's flesh, after macerating in hydrochloric acid, is placed in an autoclave and heated for six hours under a pressure of three atmospheres. This is then filtered and neutralized with KOH and diluted up to three litres, when it becomes the medium in which the plague bacillus is grown. Some plague material is put into these flasks and the bacillus is identified by what Haffkine has described as the stalactitic growth. If such cultures rest absolutely undisturbed for five or six days, after being inoculated on the surface, fine delicate thread-like processes can be seen hanging from the surface into the depths of the bouillon which have a very strong resemblance to the stalactites that hang from the

MOHAMMEDAN GIRL BEING BURIED BY THE HOSPITAL AUTHORITIES.

roof of a grotto. This growth, according to Haffkine, is pathognomonic of the plague bacillus, and the purity of such a culture can be tested microscopically. The culture is put into a Pasteur flask, from which a large series of 3-litre flasks are inoculated after it is certain that the original culture is uncontaminated. These are grown in a huge, darkened room, containing long tables on which hundreds of these 3-litre flasks rest. Owing to the high mean temperature thermostats are unnecessary in India. To make the prophylactic it is necessary to get repeated crops of the stalactites in each flask and to keep the surface inoculated; a small amount of sterile "ghee," a sort of clarified butter, which floats on the surface and always contains after the original inoculation a few bacilli, is added so that after repeated shakings the surface of the culture is always reinoculated. In this way five or six crops of stalactites are obtained before the serum is finished, and this takes, as a rule, about six weeks. After agitating the flasks, the little clumps of bacilli sink slowly to the bottom and a new surface growth slowly appears. The culture is killed by immersion in a constant water-bath at

* Haffkine: The plague prophylactic. *Ind. Med. Gazette*, June 1897.

—— Remarks on the plague prophylactic fluid. *Brit. Med. Jour.*, 1897, Vol. II.

70° C. for three hours when some carbolic acid or thymol is added, and while care is taken to keep it well shaken the prophylactic is decanted into small bottles and is then ready for use.

The usual dose of the plague prophylactic was about 2 cm., but at Hubli, where it was used most extensively, Leumann * was in the habit of using a greater quantity at each injection. He always took into consideration, however, the age and physical condition of the patient in making the inoculations. An ordinary antitoxin syringe is used for this purpose and the injection made well into the subcutaneous tissue. Injections into the skin are apparently more painful than those made well below the corium. After two inoculations with the plague prophylactic the blood of the patient usually gave the Widal reaction. This, however, is not obtained so readily after a single protective injection. Leumann allows from 14 to 20 days to elapse between the first and second injections, and regards the constitutional reaction of headache, fever and malaise as more important than the agglutination test. Extremes of age do not seem to affect the value of the inoculation, as on one occasion a child 10 days old was inoculated while on another, a woman of 90 was protected against the disease. Women as far advanced in pregnancy as the seventh month were inoculated without the occurrence of any unfavorable symptoms, a fact which is rather interesting when one considers that all pregnant women taking the disease itself abort. To avoid, as far as possible, the injection of the protein in the incubation stage of the disease, it was regarded a safe rule not to inoculate any one with a temperature of 100° F. until it was certain that he was not suffering from the plague.

BURNING GHÂT, POONA PLAGUE HOSPITAL.

Since it has now been generally recognized that, under the conditions which obtain in India, the hygienic and sanitary measures have little or no effect in influencing the course of the epidemic or lessening the mortality from the disease, the results obtained at Hubli have been most successful and gratifying. In all some 78,000 inoculations were done in a period of four months in Hubli, in the province of Dhárwár, many of which were, however, on the inhabitants of the outlying districts and villages. It seems that the double inoculations have a greater protective power against the disease than single injections of the prophylactic, which statistically is shown to amount to 10 per cent of the total mortality among the inoculated. But in Dhárwár the results were even better than at Hubli; for there were, among 4,926 single inoculations, 45 cases and 15 deaths; and in 3,387 double inoculations, 2 cases and 1 death.

Moreover, among these inoculations were undoubtedly included some cases where the prophylactic was given to those in the incubation period of the disease. Hubli, where the Haffkine serum received its first large and comprehensive test, is a mercantile town of about 50,000 inhabitants. It was attacked by the pest at the beginning of the monsoon rains, and the average monthly rainfall between October and April reached 28 inches. Although a large health camp was established, and as many plague regulations as possible were put in force, it was evident that the authorities could not cope with the epidemic, so they determined to make a thorough test of the prophylactic. Mr. Cappell, the collector of Dhárwár, says: "If this experiment had failed, the mortality, judged by the actual mortality among the uninoculated, would have been appalling. All possible sanitary measures in the shape of disinfection, unroofing of houses, and segregation were applied concurrently with the inoculation as the government is already aware; but the rate of mortality among those who held back from inoculation rose at one time to a height which, I believe has never been approached elsewhere—standing in the third week of September at the figure of 657 per thousand per week."

The duration of the protection afforded by the serum could not be definitely determined, although the majority of the citizens were protected for at least 5 months. In 69 households, all of the inoculated members escaped the disease while some of the uninoculated in the families succumbed to the disease. Perhaps a more conclusive idea of the scope of the enormous experiment may be gathered from the appended table, which shows that at only one period did the non-inoculated have a percentage advantage over the inoculated in the mortality tables and that was when the epidemic was not severe and the number of the inoculated was low.

Dates.	Number of non-inoculated in Hubli.	Number of twice inoculated in Hubli.	Deaths from Plague amongst		Percentages in favor of	
			Non-inoculated.	Twice inoculated.	Non-inoculated.	Twice-inoculated.
Five weeks From 11th May, 1898, to 14th June, 1898.	14,573	531	47	1	44 %	.....
Week ending 21st June, 1898	11,494	2,220	22	1	..	18 %
28th June, 1898	39,042	3,956	29	*Nil.*	..	100 "
5th July, 1898	36,020	5,460	55	3	..	64 "
12th July, 1898	33,255	7,289	34	2	..	72 "
19th July, 1898	29,716	8,959	82	6	..	75 "
26th July, 1898	24,112	10,311	100	9	..	80 "
2nd August, 1898	21,031	12,660	140	9	..	85 "
9th August, 1898	15,584	15,845	272	14	..	95 "
16th August, 1898	10,685	19,491	386	31	..	96 "
23rd August, 1898	6,367	23,362	371	20	..	over 98 "
30th August, 1898	4,094	26,547	328	20	..	96 "
6th September, 1898	2,731	28,671	227	23	..	over 99 "
13th September, 1898	1,146	30,911	143	39	..	" 99 "
20th September, 1898	973	31,683	106	24	..	" 99 "
27th September, 1898	683	31,872	58	16	..	" 99 "

* Report No. 7569, of 1898.

A STUDY OF CHRISTIAN SCIENCE.

By HARRY T. MARSHALL, M. D., *Fellow in Pathology, The Johns Hopkins University.*

As it is useful and interesting in the field of medicine to examine into the conditions and causes of diseases; not only for the object of curing them, but in order to understand the reasons for their existence; so, in the same way is it profitable to examine those products of civilization which may well be considered diseased, not treating them as things of no interest, but as curious pathological products, whose origin and condition it is worth while to investigate, and whose causes are of interest because they show, to a certain extent, the workings of the human mind.

Particularly must we remember, that, however irrational and absurd the condition may be, it is still the result of definite, actual forces, which can be studied and treated reasonably, in just the same way that the problems presented by a fever or an inflammation can be handled.

This evening we will consider one of the pathological conditions affecting society—a condition not unlike insanity, but a condition that affects a very large part of the community, that appears to have a strong foothold, which is powerful from the number, character and wealth of those affected by it, and which is a menace to the health and safety of the community.

In my paper this evening I will consider various features of Christian Science.

Christian Science originated in 1866, the "discoverer" being Mrs. Mary Moss Baker Glover Patterson Eddy. For upwards of ten years she developed the system, gradually gaining adherents among her acquaintances and finally in 1875 she published her book, "Science and Health with Key to the Scriptures." This marks the official beginning of the "Science." Since that time, largely owing to the energy and zeal of Mrs. Eddy, the number of her followers has been increasing with great rapidity and her "discovery" has been spread over one-half the world. At the present day the rate of increase is very high, and Christian Science is constantly being disseminated in fresh quarters. The following figures may give some idea of the present strength of the movement:

The rate of increase is said to be 40 per cent per annum, with a monthly addition of 5 to 7 churches. In December, 1899, the "Christian Science Journal" gave a list of all the Christian Science churches numbering at that time about 370, distributed among 350 odd cities. In addition, there were about 100 less completely organized congregations, over 100 Christian Science reading-rooms, and 30 odd Institutes or Academies where Christian Science is taught. There are two magazines, and many publications at irregular intervals. The churches are found in nearly every State in the Union, in Canada, England, France, Germany, Australia, Hawaii and other places. Boston and Chicago, however, are the two greatest Christian Science strongholds. The Mecca of Christian Scientists is the church in Boston, erected in 1894, at a cost of over $200,000. The expense was defrayed by subscription, and it is said that so liberal were the contributions that about $50,000 had to be returned.

It is claimed that 1,000,000 people have received Christian Science treatment, that the number of professed followers is 400,000 to 500,000 in the United States, and that there are as many more who are influenced by Christian Science but do not openly adopt the faith. Carol Norton claims 2,000,000 followers for Mrs. Eddy. In Maryland there are 500 actual members enrolled, and from 1000 to 1500 people who occasionally employ the Christian Science healers.

A noteworthy fact is that the ignorant and uneducated classes furnish but a small proportion of Christian Scientists, while the vast majority of them are people who have had good educations and who might reasonably be expected to think; people, moreover, who constantly come into contact with others of discrimination and at times with those of intellectual ability. Furthermore, Christian Scientists, with few exceptions, are drawn from those who can add at least a moderate amount to the wealth of the church.

Except for a very limited number of converts among the inhabitants of our jails, I have never heard of Christian Science being carried to the poor. Other observers have commented upon this fact.

The only life of Mrs. Eddy that I can find was apparently written by a Christian Scientist. She is of an old New England family and is now, according to common report, about 80 years of age and in feeble health. She is of a strongly religious temperament, and from childhood has been fond of such subjects as metaphysics, moral science, philosophy and logic. She has always been positive in her own opinions, and at 12 years would not yield her views concerning some religious tenets when she was admitted to the Congregational Church.

She was married in 1843 to Col. George Washington Glover of South Carolina, who died a year later, leaving her with one child. Her second husband was named Patterson. From him she was divorced, dropped his name, and Christian Scientists never mention him. He was her husband at the time of the "discovery" of Christian Science. Her third husband was Dr. Asa Eddy, who died in 1882.

She is said to have written extensively in prose and verse, under a nom de plume; in addition, she has written copiously about Christian Science and has composed some hymns. Her most important Christian Science writings are: "Science and Health with Key to the Scriptures," and "Miscellaneous Writings."

Mrs. Eddy was at one time a homoeopathic practitioner; she is an ardent advocate of woman's rights, has remarkable energy and zeal, and not only has the most implicit faith in herself and her mission, but inspires her disciples with the same faith.

As is natural in the case of a person so much before the public, there are unpleasant rumors as to her early life.

Common report has it that Mrs. Eddy was very poor before she "discovered" Christian Science. At present she has a palatial home in Boston; another at Concord; she has given munificently to her son, and is said to donate $80,000 per annum to charities.

The origin of Christian Science is described as follows:

Mrs. Eddy was always a student of the Bible, but never could understand why God's healing and consoling gospel could give her no help in her sicknesses and feeble health, even though she was always religious. The answer came in 1866 at Lynn. "In company with her husband, she was returning from an errand of mercy, when she fell upon the ice, and was carried helpless to her home. The skilled physicians declared that there was absolutely no hope for her, and pronounced the verdict that she had but three days to live. Finding no hope and no help on earth, she lifted her heart to God. On the third day, calling for her Bible, she asked the family to leave the room. Her Bible opened to the healing of the palsied man (Matt. ix, 2). The Truth which set him free, she saw: the Power which gave him strength, she felt: the Life Divine which healed the sick of the palsy, restored her, and she rose from the bed of pain, healed and free. When she walked into the midst of the family, they cried out in alarm, thinking that she had died and that they beheld her ghost: this miraculous restoration dates the birth of Christian Science."

From the foregoing outline it is evident that Christian Science is something more than an empty fad; nor can we dismiss it as humbug. We must take it for what it is—a strong and growing movement, commanding the energy, enthusiasm and financial backing of a large and influential contingent of our fellow beings and working for ends that are contrary to our ideas of progress and enlightenment. What, then *is* Christian Science? What are its ideals and ideas? What rôle does it purpose to fill in the play of human life? and what is its *raison d'être?*

The following account of Christian Science is based upon Mrs. Eddy's text-book—which her disciples hold equally as sacred as the Bible, upon lectures by Carol Norton and others, and upon information very kindly furnished me by Mr. Hermann Hering, Christian Scientist of this city.

Mr. Hering has very courteously devoted considerable time to explaining to me various Christian Science doctrines, and has furnished me with all the data respecting the organization, religious customs, the Christian Science college, &c.

As its fundamental object, the text-book advances new ideas concerning the nature and origin of sin, of sickness and of death, and purposes to abolish them entirely.

The ideas concerning sin, sickness and death are corollaries to the conclusions as to the ultimate nature of God, of the human intellect and of matter.

The central thoughts of Christian Science are contained in the following quotation from the text book (p. 7):

"The fundamental propositions of Christian Science are summarized in the four following, to me, *self-evident* propositions. Even if read backward, these propositions will be found to agree in statement and proof.

1. God is all in all.
2. God is good. Good is Mind.
3. God, Spirit, being all, nothing is matter.
4. Life, God, omnipotent Good, deny death, evil, sin, disease.
—Disease, sin, evil, death, deny Good, omnipotent God, Life."

To put it less epigrammatically: God is not merely the Creator and Controller of the Universe. He *is* the Universe. Every portion of the Universe is a portion of God. God is not a personal God. To make Him personal, they say, would be to make him finite. He is conceived of as Spirit; universal Spirit, or Divine Mind.

The most difficult task in Christian Science is to obtain a clear conception of the human intellect or soul. The following quotation may serve to give the Christian Scientists' meaning of the term.

It may be prefaced that intellect, thought, will, sensation &c., are collected under the term "mortal mind"—a term frequently appearing throughout the book with various significations. To quote (pp. 9-10):

"SCIENTIFIC DEFINITION OF MORTAL MIND.

First Degree: Depravity.

Physical: Passions and appetites, fear, depraved will, pride, envy, deceit, hatred, revenge, sin, disease, death.

Second Degree: Evil disappearing.

Moral: Honesty, affection, compassion, hope, faith, meekness, temperance.

Third Degree: Spiritual salvation.

Spiritual: Faith, wisdom, power, purity, understanding, health, love.

In this third degree mortal mind disappears."

To put it in another way. There are two forces acting upon man. Primarily man is a part of God, is controlled by God, and all that he does is right and a part of divine harmony. But in some way—how, it is not clear—a second force begins to act. This force is defined as "*mortal mind.*" This mortal mind, though endowed with powers to be stated below, has no real existence, but is only a false impression. At times this force is obedient to the Divine Mind controlling man, and acts in unison with it, but at other times, mortal mind becomes antagonistic to Divine Mind. When mortal mind is not in accord with Divine Mind, various departures from divine harmony result. These departures are not products of Divine Mind, but creations of mortal mind, and it is these creations of mortal mind that make up every ill that man is heir to. These ills are summarized as sin, sickness and death. But mortal mind does more. It is responsible for every departure from perfection that is to be found in the animal and vegetable kingdom, not only at the present day, but through all the ages. Mrs. Eddy's definition of mortal mind is (p. 583):

"Mortal Mind. Nothing, claiming to be something, for Mind is immortal; mythology; error creating other errors; a suppositional material sense, alias the belief that sensation is in matter, which is sensationless; a belief that life, substance and intelligence are in and of matter; the opposite of Spirit, and therefore the opposite of Good, or God; the belief that life has a beginning, and therefore an end; the belief that man is the offspring of mortals; the belief that there can be more than one creator; idolatry; the subjective states of error; material senses; that which neither exists in Science, nor can be recognized by the spiritual sense; sin; sickness; death."

This brings us to the Christian Science conception of matter.

Not only is mortal mind the direct cause of every evil as above described—it has further activity. The conception of God as Spirit, and of God as actually constituting the universe, necessitates the further conception that the universe is spirit; in other words, that there is no such entity as matter, and it is said that "Matter is a subjective state of mortal mind evolved in belief by false material sense" (p. 2).

The formal definition of matter is (p. 582):

"Matter. Mythology; mortality; another name for mortal mind; illusion; intelligence, substance and life in non-intelligence and mortality; life resulting in death, and death in life; sensation in the sensationless; mind originating in matter; the opposite of Truth; the opposite of Spirit; the opposite of God; that of which immortal Mind takes no cognizance; that which mortal mind sees, feels, hears, tastes, and smells only in belief."

Carol Norton, a member of the International Board of Lectureship of the Mother Church of Christian Science in Boston, Mass., says that matter is but an externalization of the human mind, and can be governed by *Mind*.

Now, starting with the conceptions that the universe is God the Spirit, and that everything else is evil and the result of the action of mortal mind, how is Christian Science to pass from the clouds of speculation to the field of practical life?

The step is simple.

No matter what may be the manifestation of mortal mind, it can always be rendered negative by creating a firm belief in the reality of Divine Mind, and at the same time just as firm a disbelief in the existence of mortal mind and its products.

The firmer these beliefs, the more completely can the manifestations of mortal mind be overcome.

What is the method by which this is accomplished?

A believer, or Christian Science Healer, sits beside the afflicted one and, as it is said, *argues* the false impression away, replacing it by the true belief. The argument, consists not in reasoning, but in the positive, confident and oft-repeated declaration of the non-existence of the disease and of the totality of Divine Mind.

This is continued as long as it is considered necessary and in addition the healer, or both patient and healer, read from Mrs. Eddy's book.

The following selections from the text-book describe the method of practice, and illustrate the Christian Scientist point of view:

(pp. 410–11) "Always begin your treatment by allaying the fear of patients. Silently reassure the patient as to his exemption from disease and danger. Watch the result of this simple rule of Christian Science, and you will find that it alleviates the symptoms of every disease. If you succeed in wholly removing the fear, your patient is healed. The great fact that God wisely governs all, never punishing aught but sin, is your standpoint, whence to advance and destroy the human fear of sickness. Plead the case in Science and for Truth, mentally and silently. You may vary the arguments, to meet the peculiar or general symptoms of the case you treat; but be thoroughly persuaded in your own mind, and you will finally be the winner.

You may call the disease by name when you mentally deny it; but by naming it audibly, you are liable to impress it upon the thought. . . . . To prevent disease or to cure it mentally, let Spirit destroy this dream of sense. . . . . Argue with the patient (mentally, not audibly) that he has no disease, and conform the argument to the evidence. Mentally insist that health is the everlasting fact, and sickness the temporal falsity. . . . . If the case is that of a young child or an infant, it needs to be met mainly through the parent's thought, silently or audibly, on the basis of Christian Science."

(pp. 422–423) "If the case to be treated is consumption, take up the leading points included (according to belief) in this disease. Show that it is not inherited; that inflammation, tubercles, hemorrhage, and decomposition are beliefs, images of mortal thoughts, superimposed upon the body; that they are not the Truth of man; that they should be treated as error, and put out of thought. Then these ills will disappear. If the lungs are disappearing, this is but one of the beliefs of mortal mind. Mortal man will be less mortal, when he learns that lungs never sustained existence, and can never destroy God, Who is our life. When this is understood mankind will be more Godlike. What if the lungs are ulcerated? God is more to a man than his lungs; and the less we acknowledge matter or its laws, the more immortality we possess."

(pp. 46–47) "You say a boil is painful; but that is impossible, for matter without mind is not painful. The boil simply manifests your belief in pain, through inflammation and swelling; and you call this belief a boil."

(p. 48) "When the sick recover by the use of drugs, it is the law of a general belief, culminating in individual faith, which heals; and according to this faith will the effect be."

(p. 51) "Mortal mind confers the only power a drug can ever possess."

(p. 369) "A physical diagnosis of disease—since mortal mind must be its cause, if it exists—generally has a tendency to induce disease."

(p. 411) "The daily ablutions of an infant are no more natural or necessary, than would be the process of taking a fish out of water every day, and covering it with dirt, in order to make it thrive more vigorously thereafter in its native element."

(p. 67) "When there are fewer doctors, and less thought is given to sanitary subjects, there will be better constitutions and less disease."

This may serve to give some idea of what Christian Science is. By applying these beliefs the Christian Scientist undertakes to turn the criminal to the path of righteousness, and give health and vigor to the weak and suffering, and eventually, to bring the world to a condition devoid of wickedness and disease, with a final triumph over death.

In a schematic way I have presented the essentials of Christian Science and it is evident that there are two main points of view from which it can be considered. I. Christian Science as a religion, and a philosophy, including its application to every-day life. 2. Christian Science as a system of medicine.

1. CHRISTIAN SCIENCE AS A RELIGION.

Mrs. Eddy constantly claims that Christian Science is pure Christianity; that the teachings of our Lord were only half understood by the Disciples, and that the early Christians soon lost completely the true idea of Christianity, and that it was

only through her "discovery" in 1866 that the full and true meaning of Christ's Doctrine was given to the world.

It is needless to discuss how much of Christianity their religion does, in fact, contain. It is enough to note that they believe in the one Spirit, constituting and controlling the universe and all the forces and powers therein. Moreover, they believe in Mrs. Eddy as the modern prophetess, or interpreter to man of the meanings of God. Her authority is almost absolute. Every word that she says is accepted by the Church without question as an *ipse dixit* utterance. Her position is not unlike that of the Pope's during the Middle Ages.

She is referred to as the "Mother of the Church," or simply as "Mother." Her church in Boston is called the Mother Church.

In this magnificent church there are two windows. In one window is a figure of our Lord. In the other is a representation of the woman described in Revelation: "A woman clothed with the Sun and the Moon under her feet and upon her head a crown of twelve stars." This woman, Christian Scientists claim, is Mrs. Eddy, and her text-book is the book referred to in Revelation. At intervals around the walls of this church are quotations signed alternately, "Jesus Christ," and "Mary Eddy."

In the Christian Science Church there are no ordained ministers. The readers at any church are elected by the congregation, subject to the approval of the Board of Directors in Boston. There are no grades corresponding to bishops, deacons, etc. Mrs. Eddy's own pupils, however, are looked upon as of higher authority than others.

There is no baptism, no confirmation, no giving of the sacraments at communion, and no special marriage services. The communion is celebrated twice a year, and is purely a mental or spiritual receiving of the same. There are no marriages performed in Christian Science churches except by readers who were previously ministers in Christian churches, and, therefore, by their former ministry, authorized to perform the ceremony. This is done, as a Christian Science reader told me, "So that not every Tom, Dick or Harry could marry people."

In general the government of the churches is Congregational in its outlines, that is, they are independent of each other to a large extent. But each church is controlled by Mrs. Eddy and by a Board in Boston that exercises a general supervision over the church in business, religious and legal matters.

The readings in all Christian Science churches are identical at any given service, the selections being made by the Board in Boston.

There are two forms of service: the informal experience meetings and the regular services.

The latter consist in reading selections from the Bible and from Mrs. Eddy's book and in singing hymns. At a meeting that I attended there were two readers. No. 1 read a few verses from the Bible. No. 2 then read Mrs. Eddy's interpretation of it. No. 1 then read a few more verses from a different part of the Bible, to be followed by Mrs. Eddy's interpretation, and so on. The only departure from the above routine is when a circular letter is read from "Mother to her children."

In this religion there is no thinking, no reasoning, no room for the use of the natural energies of the mind; in other words, no room for advance.

Mrs. Eddy's interpretation of the Bible furnishes the most wonderful part of the whole subject of Christian Science, for it is wonderful that anybody can take it seriously for an instant.

I do not care to comment upon the gross ignorance displayed in her derivations and interpretations, upon her vapid mysticism, nor upon her childish fondness for alliteration and cheap plays upon words; but instead I will merely read a few selections from her book:

Mrs. Eddy devotes a chapter to explaining scriptural words in terms of Christian Science; prefacing the chapter with the remark that "It contains the metaphysical interpretation of Bible terms—giving their spiritual sense, which is also their original meaning" (p. 570).

The following are a few of Mrs. Eddy's definitions:

"*Benjamin* (Jacob's son): A physical belief as to life, substance, and mind; human knowledge, or so-called mortal mind, devoted to matter; pride; envy; fame; illusion; a false belief; error masquerading as the possessor of life, strength, animation and power to act; renewal of affections; self-offering; an improved state of mortal mind; the introduction of a more spiritual origin; a gleam of the infinite idea of the infinite principle; a spiritual type; that which comforts, consoles and supports" (pp. 572–3).

"*Earth:* . . . To material sense, earth is matter; to spiritual sense, it is a compound idea" (p. 576).

"*Hiddekel* (river): Divine Science, understood and acknowledged" (p. 579).

"*Euphrates* (a river): Divine Science encompassing the Universe and man; the true idea of God"; etc., etc. (p. 576).

"*Gihon* (river): The rights of woman acknowledged—morally, civilly and socially" (p. 578).

"*Wine:* Inspiration, understanding, error, fornication, temptation, passion" (p. 589).

These selections suffice to give the general tenor of Mrs. Eddy's interpretation of the Bible.

The theology of Christian Science is not the theism of the Christian religion which looks upon God as "more than the sum of all things, but as intimately present with all things, so that all energy is an immediate manifestation of God" (Bates). On the contrary, Christian Science is almost a pure pantheism, although Mrs. Eddy vehemently denies it. Where it falls short of absolute pantheism, is in the denial of the existence of matter.

As an ethical system, Christian Science approaches more closely to the subjective idealism of Berkeley than to any other system. But it is not a subjective idealism, because it denies individuality and personality—prerequisites, of course, to Bishop Berkeley's system.

It may then be called a "Pantheistic Idealism" or an "Idealistic Pantheism." (W. B. Greene, "Christian Science, or Mind-Cure.")

In connection with this philosophy it is of interest to note that free will is impossible; that thought is precluded, for it requires mortal mind which is unreal; and that all the phe-

nomena of sense, *i. e.*, the data of universal human experience, are declared false and unreal.

There is one incorporated Christian Science college, that of Mrs. Eddy, in Boston. The other institutes, etc., where it is said that Christian Science is taught and cures effected, apparently occupy the position of primary schools of Christian Science. In the Massachusetts Metaphysical College there are three courses: one leading to the degree of C. S., the second to the degree of C. S. B., and the third to C. S. D. Each of these courses consists of a series of about 16 lectures and costs the pupil $100. In addition, there is a course by a certain Dr. Baker, a regular practitioner, who is a convert to Christian Science. Dr. Baker gives a shorter course, *i. e.*, less than 16 lectures, in which he undertakes to teach to the senior grades some practical medical procedures. This course consists entirely of lectures without any hospital or laboratory training.

In their every day life Christian Scientists drop, to a great extent, their belief that matter is non-existent and a false belief of mortal mind. They eat, dress, live in houses, walk through doorways instead of theoretically non-existent brick wall, and in general live the same life, subject to the same conditions as the most materialistic of us.

While they assert that all the data of human experience in relation to the outside world are false, and no more true and actual than are dreams, still, they consider it best, under the present circumstances, to accept things as they are. Accordingly, they approve of education—even of advanced education—in history, philology, sociology, and even in some of the sciences. They positively refuse to have any dealings with the biological sciences, or with anything that gives a knowledge of the structure or action of the human body, of the action of drugs, or of the study of diseases. They say that the more these subjects are studied the more impossible it is for the student to acquire the proper belief in the totality of Divine Mind and the falsity of matter, disease and death.

Upon the problems of death and the origin of life, I cannot make clear to you the Christian Science views. To questions that I asked upon these points, I was told that it required years of study of Mrs. Eddy's system in order to arrive at a correct understanding. The stumbling-block with me is briefly set forth. In the first place, as all Christians believe in the immortality of the soul, that question need not be considered as a special Christian Science problem, and it only remains to deal with the body. Can Christian Science save the body from death? Now, Christian Science states that there is no body, but only a false belief—a belief, moreover, which can be and is to be obliterated. If the body is obliterated, how is Christian Science to save it from death? It reminds one very much of the grin without the cat that surprised Alice in Wonderland.

Similarly with the origin of life. Every new individual born is only another false belief. But in a natural state each individual is a part of Divine Mind. How, then, does Divine Mind, which denies evil, come into association with this false belief? It is another way of putting the question suggested earlier in this paper: If the original man is part of All Good, as Christian Scientists tell us, having no activity nor volition, except from Divine Mind, how can the evil mortal mind originate? This has never been explained, so far as I know.

Let us now consider

2. CHRISTIAN SCIENCE AS A SYSTEM OF MEDICAL PRACTICE

At the outset we are met by the question just considered. If the body is a false belief, and sickness is a false belief, what would be the effect if the patient returned to a condition of harmony with Divine Mind? Why should not body be nullified as well as sickness?

Christian Science denies the utility of medical knowledge and medical methods, and refuses to use drugs, surgery or any therapeutic agent other than Divine Mind. The study of any medical science is reprehensible. They abhor diagnosis, for Mrs. Eddy says that the diagnosis of a disease tends to bring on the disease. They utterly disapprove of hygiene, cleanliness, antiseptics, vaccination, the isolation of contagious diseases, and, in general, of all those methods ordinarily considered useful in the prevention and relief of disease. They undertake to cure every form of disease by inducing the patient to disbelieve in its existence and acquire faith in their God. Not only do they undertake to cure adherents of the system, however, but also non-believers; that is to say, a person who does not believe is cured by his belief.

The method employed has been described above.

Mr. Hering says that he has had about 80 per cent of cures, including those cases given up by regular practitioners. This percentage is almost surely incorrect. The Rev. Oliver Huckel estimates that 5–15 per cent are cured in Christian Science.

The reasons for supposing that Christian Scientists claim more cures than they effect are the following:

1. They keep no records of cases and, therefore, cannot note accurately what changes occur in the patient.

2. They make no diagnosis of disease, and, therefore, there is no assurance that they have treated the diseases claimed.

3. They make no examination of the patient after treatment, and, therefore, there is no proof that they have effected the cure claimed.

Dr. Huber, in New York, had a chance to examine some "cures" and found absolutely no basis for their claims. All attempts to get proofs of their good results have failed. Mr. Purrington attempted to get them from Mr. Carol Norton. The proofs consisted in short statements by the Christian Science healers.

There is, however, no doubt that a certain number of cases recover. These recoveries depend upon two chief factors:

In the first place, as is well known, the majority of sick people recover without, or in spite of, treatment. This is a well-recognized fact. Such cases are regarded by Christian Scientists as cures due to their methods. The second factor is undoubtedly the method employed by Christian Scientists. The cures from this are, in all probability, but a small proportion of the whole.

Now, the important question is: What is their method? Have they added anything new to the stock of medical

knowledge? I think there can be no doubt that they have not.

In spite of the most vigorous denials by Mrs. Eddy; in spite of the most solemn assurances from Mr. Hering that I do not understand the case; I can not escape from the conviction that the only therapeutic agent at work in Christian Science is mental suggestion. The fact that the healers and patients are firmly convinced that each cure is a divine manifestation, does not weaken, but indeed supports this idea. The reasons for this conclusion are numerous:

At one time Mrs. Eddy was a homoeopathic practitioner and employed the greatly diluted preparations of that cult. She found that she could obtain just as good results by giving no drugs as by using the weak drug. This put her on the track of Christian Science, and this is nothing in the world but pure mind-cure, or mental suggestion. Moreover, she constantly illustrates the action of Christian Science by references to this feature of homoeopathy.

Secondly, Mrs. Eddy was at one time under treatment by a Dr. Quimby, who employed hypnotism. Her text-book appeared about a year after his death.

The strongest evidence that Christian Science is mental suggestion with a different name is furnished by her method of employing it. The patient is told to be calm, and is assured that all will go well; that he must try to aid the healer by believing that what is told him is true. The healer then, quietly, but firmly asserts and reiterates that there is no pain, no suffering, that it is disappearing, that belief will come, that the patient is getting well. As an aid to render the patient more susceptible, an appeal is made to that most potent agent, religious fervor.

If the name were not given, one would suppose that the description was not of Christian Science, but of hypnotism. It is not improbable that the subjects are, at times, actually hypnotized.

The Rev. Mr. Huckel's statistics also are in favor of the mental quality of Christian Science healing. He finds that Christian Science has about the same percentage of cures that are effected by other mind-cures, as at the various Catholic shrines; by avowed mind-healers, and in the cases treated with bread-pill medicines.

There is no point upon which a Christian Scientist is more emphatic than in denying that Christian Science healing is due to mental suggestion. According to Mrs. Eddy, Carol Norton and those Christian Scientists with whom I have conversed, the healing is effected not at all through mental suggestion, not through any miraculous intervention, involving a departure from the normal course of nature, but by the natural, ever present action of the Divine Mind. The cures of Christ (which they deny were miraculous) were of the same character.

Healing, as they practice it, is not only the privilege of every Christian; they claim that Christ has made it a duty for every one of his followers to "heal the sick" (Matt. x, 8), a duty as binding as any other Christian observance.

There is one feature of Christian Science healing that I have delayed mentioning, because I wanted to give it especial prominence, that is, the Christian Science treatment of children too young to be given the "argument treatment" as it might be called.

Incidentally it may be noted that the same treatment is employed to cure children, animals and plants.

The Christian Scientist goes upon the assumption that, if the child is too young to have false beliefs himself, any illness that may overtake him is the result of false belief on the part of his parents or of those in charge of him. Therefore, when summoned to attend a child the Christian Scientist pays absolutely no attention to the child, but proceeds to convince the parents that there is nothing the matter with it; that there is only a wrong belief in their minds which they must dismiss if they wish the child to recover. This is the only treatment given. No matter (as has happened) if the child is suffocating with diphtheria, no matter if he is suffering from the most fatal digestive disturbances, no matter if he is racked by whooping-cough, or covered with the eruption of scarlet fever, the treatment is the same. In no case do they recommend any medicinal treatment, nor attempt to alleviate in any way the infant's distress. And all this, in the name of Religion!

Let us now look at Christian Science as a whole. We see that the head of the movement is a woman, who is considered by some to be the victim of a form of insanity, known as paranoia; a woman whom many more consider simply an impostor, growing rich at the expense of her deluded followers; a woman evolved from homoeopathy, who claims the powers of Divinity.

We see that this woman has built up a system showing the utmost crudeness of construction, full of inconsistencies and self-contradictions; displaying, at every turn, the author's ignorance of the meanings of words, her confusion of ideas and complete inability to reason logically. We see the head of this system guilty of horrible blasphemy. We see her denouncing as false the findings of all human experience, and we see her arrogantly vaunting herself as the only human being with true knowledge, and on every page of her book boasting of her superior wisdom. We see the members of this school making the most extravagant claims of their power over disease; we see them, in the name of religion, stand passive at the bedside of suffering infancy; we see them, in the name of religion, attempting to undo all that has been accomplished by millions of earnest workers and thinkers to better the conditions of human life.

On the other hand, we see this sect growing like a mushroom. We see that thousands of rational people accept Christian Science *in toto*; that it numbers among its followers judges, lawyers, doctors, ministers, business men and people of all classes. We see them devoting to it their time, their enthusiasm and their money. We see people, whom it would be ridiculous to call insane, refusing any other assistance in their most serious illness and relying upon the efficacy of Christian Science to save their children from the grave.

How can we account for this curious condition? What gives Christian Science its strength? Is there any way in which to explain its existence?

If we try to account for the immense following of Christian Science and its strength by the intrinsic merits of its teaching

and work, we must remain unsatisfied on account of the insufficiency of motive.

Christian Science appears to have no points in its favor that are original or peculiar to itself. The idea that disease is a work of evil, or—in the Christian Scientist's nomenclature—of mortal mind, is as old as history. This idea of sin as a work of the devil, is seen in the histories of all the ancients; it occurs in the Bible; it was the thought that prompted the treatment of insane people in the olden times when they were put in mad-houses and frightfully abused in order to drive out the evil spirit, and it is not an uncommon thing to see evidences of the same idea nowadays.

Again, the most attractive feature of the Christian Science religion is the manner in which they insist upon the healthfulness and necessity of cheerfulness, composure and self-forgetfulness. Their religion teaches them to forget their own sufferings and distresses and to take an interest in outside things.

But this cannot account for the strength of Christian Science, for this is not a new doctrine. The same thing is being brought more and more to the front as an essential part of personal religion by the churches throughout the land.

Again, the only idea brought forward by the medical teaching is the efficacy of mental suggestion as a therapeutic agent. But this is by no means new. There is no one who denies its utility; it is employed, consciously or unconsciously, to a very wide extent, while one branch of it—hypnotism—is steadily growing in importance as a therapeutic agent.

But if we cannot find the *raison d'être* of Christian Science in its intrinsic qualities, how is it explicable?

This brings us to the consideration of a curious phenomenon presented by society. It is a phenomenon that has occurred from time to time since the foundation of society, and consists in the rise and enormous popularity among reasoning people of ideas that are utterly irrational, or contain but a grain of reason. It is the same phenomenon illustrated by the original spread of homoeopathy, of Thompsonianism, of Perkinism, of theosophy, of Schlatterism, and by the history of many more popular fallacies, either defunct or passing.

I regret that I can do no more than touch upon this subject. There are certain factors that may be considered to afford a particularly fertile field for the growth of Christian Science.

In the first place, there is always an element in the community whose tendency is to go to extremes in adhering to their ideas. A person of this class, being convinced of the truth of that portion of Christian faith which teaches the universality of God, will apply his belief blindly to every case, without regard to any evidence that fact and reason may oppose.

Secondly, the great improvements in the material comforts of modern life and, also, the great development of the natural sciences, with their rigid demonstration of material origin and causation, are (at least in part) responsible for the materialism that so widely pervades modern thought. It is only natural that there should be a reaction from this materialism and from its causes, to the extremes of idealism.

In the third place, there are always people eager for something new, seeking for miracles and ready to believe it possible to obtain that complete mastery over nature, that Faust despaired of acquiring after a life of endeavor.

The chief basis for the growth of Christian Science, however, is the same that underlies every popular pseudo-science. Oliver Wendell Holmes outlines very clearly the factors concerned, showing (*a*), how easily abundant facts can be collected to prove anything whatsoever; (*b*), how insufficient, "exalted wisdom, immaculate honesty and vast general acquirements," are to prevent an individual from having the most primitive ideas upon subjects out of his line of thought, and, finally, demonstrating "the boundless credulity and excitability of mankind upon subjects connected with medicine."

The same conditions referred to in Holmes' essay are responsible for Christian Science. Furthermore, Christian Science is partly a religious mania (though the title of the text-book shows the relative importance of its medical and religious doctrines).

A further source of strength in Christian Science is the confidence with which the teacher assures her followers that they are the only profound thinkers in the world, and makes them believe that the adoption of her ideas is a mark of superiority separating them from the ordinary masses.

Such being the status of Christian Science, what may we conclude as to its future?

There is no doubt that the only grain of truth that supports Christian Science is its employment of mental suggestion. It is probable, also, that mental suggestion has a much wider field of application than it receives at present. It is not improbable, I think, that, as regular practitioners develop the possibilities of suggestive therapeutics more and more, they will cut away the only prop that can hold up Christian Science; though it will almost surely disappear even without such deprivation.

It is really no stretch of the imagination, to predict that our generation will see the decadence of Eddyism and the rise of another pseudo-science just as impossible as Christian Science, and just as powerful.

Christian Science is very shrewdly planned to give it the strongest and most permanent foothold possible. The regulation, limiting the right to perform the marriage ceremony to the converted ministers from other churches illustrates this, and features of their medical system serve as better illustrations.

In the first place, although they claim to cure all diseases, Mrs. Eddy advises them not to deal with surgical cases. The reason for this is obvious. The good or bad results of treatment in surgical cases, as for instance fractures, are much more evident to the ordinary person than are the results from medical diseases, as typhoid fever; and bad results in such cases would lay the Christian Scientist open to prosecution in court. Again, Christian Scientists, when called in to treat cases, profess the utmost willingness to allow regular practitioners to be summoned (though they advise their followers of the wickedness of such procedure); they refuse to charge fees for services rendered (though Mrs. Eddy has stated that "Christian Science demonstrates that the patient who pays whatever he is able to pay for being healed is more apt to recover than he who withholds a slight equivalent for health") (Miscel-

laneous Writings); they give no remedies nor medical advice; for that would subject them to prosecution. And, finally, they claim that they themselves are not the effectors of cures, but the agents of God, and that to interfere with their medical practice is to interfere with their freedom of conscience, and right to pursue their religious teachings.

In concluding, I must state what seems to be the proper attitude for us to hold towards Christian Scientists.

There are really not many active measures that we need adopt toward this cult. The most rapid and efficient means of destroying them is to bring prominently before the public the manifest absurdities of the school, and the dangers attending its spread. Severe measures would tend to strengthen their hold by putting them in the position of persecuted martyrs. There are, however, three points, that it is well to aim at in dealing with them.

1. To insist that they report to the Health Department all births, deaths and contagious diseases, and that, in the latter class of cases, they take proper means to protect the community.

2. To secure for small children the proper protection from Christian Science extravagances.

3. The third point is too big to be more than touched upon here, and deals with the regulation of medical practice in general; but, in brief, we should attempt to limit the right to treat the sick to those who have given satisfactory evidence that they possess a knowledge of the conditions of health and disease, and who can show that they have the requisite training. These objects are to be attained by legislation to debar the ignorant from practice, and by prosecuting in the courts those who practice without the proper qualifications.

This is a very important question, and one that has been brought to the front already. There are numerous cases in which Christian Scientists have been prosecuted in various States, but up to the present they have escaped either upon the ground that they were not medical practitioners, but were simply meeting the demands of their religion, or upon a defect in the statutory definition of what constitutes the practice of medicine. Upon the first of the points the Supreme Court of the United States has declared that no one can violate the law under the cloak of religion.

The usual defect in the statutory definition of medical practice is that the giving of drugs or other medical treatment is considered necessary to make a person a practitioner, and Christian Scientists use no medical measures.

The questions involved here with a list of cases is very fully considered in a recent book by William A. Purrington, of New York.

TWENTY-FIFTH ANNIVERSARY OF DR. WELCH'S GRADUATION.

On the evening of May 4, Prof. Councilman of Harvard University, in behalf of the students and coworkers of Dr. Wm. H. Welch, at a complimentary dinner held at the Maryland Club, Baltimore, presented him, in honor of the twenty-fifth anniversary of his doctorate, a volume of contributions to the science of medicine, containing 38 papers, all embodying original research. (See page 138.)

ADDRESS OF PROFESSOR W. T. COUNCILMAN.

On this occasion, 25 years after your entrance into the medical profession, we, your students, present to you this volume. It contains a number of articles written by us, each of which contributes to the advancement of medical knowledge. We have chosen this method to tell you of our esteem and affection, for we feel that it is the highest and most enduring tribute we could lay before you. For, unlike any tribute wrought in stone or metal, it has the quality of increase. The results of the investigations here set forth will stimulate further investigations and lead to still greater increase of knowledge. It is the work of men you have taught, who have come under your influence and who have received from you the inspiration which has enabled them, often amid great difficulties, to continue in the path along which you first led them.

It is one thing to tell a man what is the right way; it is better still to show him; but it is quite another thing to take him by the hand and lead him along it. This you have done, and it is this which has made you the great teacher which you are, for a teacher to be great must be a leader among men. You have taught us what is known. In your lectures you have presented to us, with a clearness that has never been surpassed, the known facts of medical science and the deductions to be drawn from those facts. We have learned from you the importance not of theory, but of definite knowledge. You have further showed to us that merely to acquire what is known is not the true aim, but that he who would himself advance and contribute to the advancement of his fellows must seek to enlarge the bounds of knowledge. By your own work you have led us. The importance of the work you yourself have done is recognized by the world. It has been marked by your characteristic clearness, thoroughness and fairness. In the work which you have inspired, there has been absolute freedom in the worker. You have always sought to turn their investigations into the development of truth.

The work has been in a broad field, and the workers have had a clear sky above and fresh breezes around them. All branches of medical science have been enriched by this work. The breadth of the work is shown in the subjects treated in this volume. We feel that you are a part of it, that our work is due to your inspiration. But your work as a teacher and leader has not been confined to those who have felt your presence; it has been far wider. Your influence has been felt in every part of the country, because each man who has gone from you has been a missionary burning to lead others into the light.

One year after your graduation, The Johns Hopkins University opened its doors. The central idea of the university, the idea with which it started, which distinguished it from other institutions of learning in this country at that time and gave it at once its high position in the world, is that it is the duty of a university both to impart knowledge and to increase knowl-

edge by original research. In the medical education at that time there were no high ideals. There were numerous schools in which the medical art was taught, but in no place had the university ideal, which aims at the advance of knowledge, entered into medical education. Not that there were not a few great teachers, but the principle was not there.

The creation of the Medical School of the University was slow. First physiology and then pathology were established as departments of the university. Sixteen years ago, Dr. Welch, you were called to the chair of pathology in the university. There was no hospital to furnish material, no students to teach. You began your work, and before the hospital was opened you had grouped around you an earnest band of workers. Those of us whose fortune it was to have been with you in those early days can never forget them.

When the Medical School was opened, the ideals of the university had been established in its most important departments and were a controlling power. There sprang up at once that close union between the university and the medical school to which, more than anything else, the marvelous growth and influence of the medical school has been due. The medical school was founded in the laboratories of physiology and pathology. There has been in the medical school and in the hospitals a close union between art and science, an appreciation of their mutual dependence, which in its fullness was new to America.

We have ourselves tried to do what we could to advance knowledge and to extend to others the ideals which we learned from you. Your spirit lives in us, and we extend to you in this work the best expression of our affection, our esteem and our gratitude.

Address of Professor Welch.

On accepting the volume, Dr. Welch replied as follows:

My friends and fellow students:—I have no words adequate to express my appreciation of this demonstration of your affection and loyalty. With a heart full of thanks I accept this magnificent volume of contributions to medical science by my pupils and coworkers, now and in the past.

I thank you, Dr. Councilman, for your generous words in presenting this volume, even if I must believe that your estimate has far exceeded my merits. Although I have been kept in ignorance of the details of this undertaking, I know that my especial thanks are due to Dr. Mall and Dr. Flexner for its inception and conduct, as well as for the incentive to several of the contributions. Turning the pages, I see how much is due to the marvelous artistic skill of Mr. Broedel, and I am not surprised to hear of the unselfish devotion of Dr. Hurd in the editorial work, nor that my old friend and colleague, Dr. Halsted, has been active in arranging for this occasion. To all who have honored me by their contributions to this volume I am deeply grateful, and the kind messages from many other pupils and associates have gladdened me.

Nothing could afford me livelier pleasure and satisfaction than to have my name associated in this way with a volume of contributions, which cannot fail to interest all workers in scientific medicine. I recognize among the contributors not only the names of those who have gained distinction as investigators, but also of those who are beginning their careers and will now win their first spurs. To me the most significant feature of this occasion is that the time has come in America when a group of investigators, more or less closely connected through common teachers, can bring together so large a number of important, original contributions to medical science. Twenty-five years ago this would not have been possible. That I should have been permitted to participate with others in bringing about this advance is to me a source of much gratification.

When Dr. Prudden and I first started our small laboratories in New York, he at the College of Physicians and Surgeons, and I at the Bellevue Hospital Medical College, the outlook was not encouraging for a young man to select pathology for his career. The contrast between then and now in this respect is indeed a striking one. To-day, pathology is everywhere recognized as a subject of fundamental importance in medical education and is represented in our best medical schools by a full professorship; at least a dozen good pathological laboratories, equipped not only for teaching but also for research, have been founded; many of our best hospitals have established clinical and pathological laboratories; fellowships and assistantships afford opportunity for the thorough training and advancement of those who wish to follow pathology as their career; special workers with suitable preliminary education are attracted to undertake original studies in our pathological laboratories; students are beginning to realize the benefits of a year or more spent in pathological work after their graduation, as a foundation for future success in practical medicine, surgery, or the specialties; and as a result of all these activities the contributions to pathology from our American laboratories take rank with those from the best European laboratories. While we realize that we are only at the beginning of better things and that far more remains to be accomplished than has been attained, nevertheless, the progress of pathology in America during these twenty-five years has surely been most encouraging.

When I look back over this quarter of a century I realize how favored I have been by my opportunities, and here you will permit me to be somewhat personal. My interest in pathologic anatomy was awakened in my student and hospital days by Delafield and Janeway, who are among the best pathologic anatomists whom I have ever known. I received also a strong stimulus toward scientific work from Jacobi, whose seventieth birthday will be celebrated to-morrow night in New York by well-earned honors. I owe more than I can tell you to my teachers in Germany, to Cohnheim, Weigert, von Recklinghausen and Wagner, and through them to the great master, Rudolph Virchow. Upon my return to this country, my association with Dr. Austin Flint, the elder, was to me an inspiration, and in many ways of the greatest advantage.

While the prospects for earning a livelihood and for advancement in a pathologic career may not have seemed encouraging in New York, 22 years ago, in reality the circumstances were fortunate. About that time there were introduced great improvements in histologic technic, which led to a deeper insight into the structure and activities of cells and opened the way for new directions of development. Above all, it was the begin-

ning of the bacteriologic era marked by the great discoveries of Koch, of whose earliest work I saw something while studying in Cohnheim's Laboratory in Breslau, and whose personal teaching I later enjoyed. To have begun one's work as a teacher of pathology at such a period and after intercourse with such masters of the science, and to have been permitted to continue it during these years of unparalleled progress, must be considered a circumstance fortunate for the teacher.

The time was fully ripe in this country for the introduction of laboratory teaching and investigation in pathology, and it is certain that if one had not appeared to undertake it, another would have done so. It was an easy matter under such circumstances to demonstrate the value of the pathologic laboratory in medical education. I have every reason to feel grateful for the encouragement and support accorded the little laboratory at Bellevue College and the opportunities there afforded to me. Prudden's Laboratory, founded about the same time at the College of Physicians and Surgeons, has developed under his masterly direction into a large and splendidly equipped laboratory, surpassed by none in its influence upon the advancement of pathology in this country. I need not speak here of the wider opportunities, so well known to you, which I found in Baltimore, of the liberal policy of the Trustees of The Johns Hopkins University and Hospital in the establishment and support of the Pathological Laboratory, of the advantages derived from the intimate association of the Medical School with this great University and Hospital, of the stimulus received from my colleagues, and of the attraction of our high standards of education in drawing to us highly trained students.

Above all, most fortunate have I been in those who have worked with me as pupils and associates, and to these co-workers is due in the first instance whatever of success has attended my efforts as a teacher and student of pathology. I am delighted to see here to-night my old friend and co-worker in the New York Laboratory, Dr. Meltzer, and also Dr. Beyer. To have had such a coadjutor in the early organization and conduct of the Baltimore Laboratory as Dr. Councilman, such an original investigator as Dr. Mall for the first fellow in pathology, such special workers in the early days of the laboratory as Sternberg, Halsted, Herter, Abbott, Bolton, Nuttall, Booker, Miller, Barkley, Clement, Howard, Russell, Blachstein, Thomas, Williams, Randolph, Gilchrist, and others—all of this I count as the best of good fortune. I call to mind on this occasion with affectionate regard many others who have followed these earlier workers, but the list is too long to enumerate. I must, however, give expression of my indebtedness to Dr. Flexner, who since the opening of the Medical School until the end of the last academic year has been my closest associate in the work of teaching and in the supervision of the laboratory.

While it has been hard to part with such associates, it is a matter of pardonable pride that so many have been called to important chairs in other institutions—Councilman to Harvard; Abbott, Flexner and Clark to the University of Pennsylvania; Wright to the Laboratory of the Massachusetts General Hospital; H. U. Williams to the University of Buffalo; Blumer to the Bender Hygienic Laboratory in Albany; Bolton to the Hoagland Laboratory and subsequently to other institutions; Howard to the Western Reserve University; Nuttall to the University of Cambridge, England; Russell to the University of Wisconsin; and now we are to lose Barker, most scholarly, versatile, inspiring of teachers and profound in his studies, who has been called to an important position in the University of Chicago. That we shall retain with us young men of great promise is evidenced by such contributions as those of Cullen, Cushing, Young, Bardeen, the MacCallums and Opie in this memorial volume. I rejoice to see in this book in connection with Cushing's, the name of our much-loved Livingood, whose career of unusual promise was cut short by an ill-timed fate.

I should like to be able to speak of the value of the contents of this volume which you have dedicated to me, but I see it for the first time to-night. A glance through the pages assures me that here are gathered together papers with which any medical teacher in the world would be proud to have his name associated. I may be permitted to call attention to the importance of the contributions from our women students; and it will not, I trust, be invidious if I mention the superb work of Miss Florence Sabin, done under Dr. Mall's and Dr. Barker's direction, and so beautifully illustrated by Mr. Broedel.

As I have already said, I see in this volume of studies an index of the great advance during the last quarter of a century in the material conditions surrounding pathological teaching and investigation in this country, brought about especially through the establishment of laboratories. It is also a significant token of the greater things which we may assuredly expect in the future, when America will take her place in the front rank with those countries which contribute most to the progress of the medical and biological sciences. If my name shall ever be mentioned among those who in those earlier days have helped to promote our science in this country, I shall owe it above all to you, my pupils, colleagues, and fellow workers.

MONOGRAPHS.

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CONTRIBUTIONS TO THE SCIENCE OF MEDICINE DEDICATED BY HIS PUPILS TO WILLIAM HENRY WELCH ON THE TWENTY-FIFTH ANNIVERSARY OF HIS DOCTORATE.

TITLES AND ABSTRACTS.

I.

A Contribution to the Study of the Pathology of Early Human Embryos. By FRANKLIN P. MALL, Professor of Anatomy, Johns Hopkins University. With 6 plates and 29 figures in the text. (Pages 1 to 68.)

The paper is based upon the study of 50 pathological human ova which have been collected by the author during the past six years. Nearly all of the embryos were cut into serial sections, thus permitting of a more careful study than is possible from that of the external appearances alone. As far as possible, additional data were obtained from the physicians from whom the specimens were obtained, and these prove to be of much value.

The paper discusses the following subjects:

1. Arrested development of the embryo with continued growth of the ovum.

2. Degeneration of the embryo, leaving only the umbilical cord.

3. Ova, normal in form, without embryos and uterine moles.

4. Vesicular forms of pathological embryos.

It is followed by an appendix giving the main data of all of the normal embryos known as well as a detailed description of each of the pathological specimens discussed in the communication.

II.

On Urea in Some of its Physiological and Pathological Relations. By C. A. HERTER, Professor of Pathological Chemistry, University and Bellevue Hospital Medical School, New York. (Pages 69 to 109.)

The physiological portion of this paper deals (*a*) with experiments which were undertaken with a view to comparing the capacity of different types of kidney in the excretion of urea, and (*b*) with the experiments relating to the nature of the cell activity concerned in the excretion of urea.

The pathological section is devoted to a record of experimental observations on the following subjects: (*a*) the toxic action of intravenous infusions of watery solutions of pure urea, especially in dogs and monkeys, (*b*) the action of urea upon experimentally damaged kidneys, (*c*) double nephrectomy and its effects upon the urea content of the blood, muscles, liver and brain, (*d*) insufficiency of urea in the course of renal disease, (*e*) the relation of an excess of urea in the blood (literal uræmia) to uræmic states. Evidence is brought forward in this section of the paper which indicates that a large excess of urea in the blood is capable of giving rise to disturbances which manifest themselves clinically, although in some examples of conditions included by clinicians as uræmic it is quite clear that urea can play no part in occasioning the symptoms.

III.

The Direct Action of Nicotin upon the Mammalian Heart. By HENRY G. BEYER, M. D., Surgeon U. S. Navy. With 9 figures in the text. (Pages 111 to 134.)

This paper gives an account of some experiments made upon the isolated heart of the cat with nicotin in blood in different degrees of strength; it also describes the effects of nicotin on the dog's apex on which two experiments were made; finally, several experiments are recorded in which nicotin in blood was allowed to run through the coronary vessels while the heart was in a state of fibrillation.

The experimental evidence brought out seems to warrant the following conclusions, namely:—(1) Nicotin acts as a powerful stimulant on the vagus nerve endings as well as on the accelerator or augmentor nerve endings in the heart; (2) it increases both the tonus and the irritability of the muscular fibres of the heart and, lastly, causes the contraction of the coronary vessels.

IV.

The Effect of Shaking upon the Red Blood-Cells. By S. J. MELTZER, M. D. New York. (Pages 135 to 151.)

The conclusions reached are as follows:

1. Shaking of even a very short duration has a detrimental effect upon the red blood-cells, which manifests itself by an early separation of the hæmaglobin followed by a rapid breaking down of the stromata into dust.

2. The process of defibrination is invariably very injurious to the life of red blood-corpuscles.

3. Prolonged shaking of the blood with a granulated insoluble substance turns the red blood-cells into fine dust. Cells of different animals show different degrees of resistance. The destruction is due to a molecular shock and not to a gross injury. The continual shaking beats together again the fine dust into large granules and dust. Possibly the molecular destruction is characteristic of organized elements.

4. Certain degrees of shaking can also prolong the life of the red cells, but the degree which is favorable to the life of the cells of one species of animal may be detrimental to the cells of another species.

These relations present a special instance of the general law formulated by the writer for the relations of vibration to all living organisms; for each individual form of life there is a minimum degree of vibration which is indispensable and another degree which presents the maximum limit.

V.

The Blood-Vessels, Angiogenesis, Organogenesis, Reticulum, and Histology of the Adrenal. By JOSEPH MARSHALL FLINT, Baltimore. With 8 plates and 28 figures in the text. (Pages 153 to 228.)

The adrenals are situated in what may be termed the vascular crossroads of the abdomen, for within a few centimetres of them the large trunks which supply almost all of the abdominal viscera are given off. Most of these contribute to the circulation of the glands which may be divided into three systems of vascular units, supplying respectively the capsule, cortex and medulla. In the capsule, there is an arterial and a well marked venous plexus. From the former the branches which supply the entire organ are derived. The blood-vessels of the cortex consist in the main of parallel capillaries with transverse anastomoses which empty into the venous tree of the medulla; while the arteries supplying the medullary substance pass entirely through the cortex to ramify in the medullary portion of the gland, giving off in their course arterioles and capillaries which empty finally into the branches of the venous tree, or into medullary veins which join them. The venous tree itself flows into the lumbar vein at the hilus of the gland.

This complex vascular system, following partially known laws, can be traced by means of injected embryos in its gradual evolution from the simplest to more complex stages, until finally the adult arrangement is reached. Curiously enough, the medulla is developed outside of the cortex and grows into it after the latter is well formed, the various steps in this transposition being beautifully shown in stained or injected adrenals of embryo pigs. Of especial interest is the fact that simple mechanical misplacements may lead to anomalies of structure in the adult gland, occurring during the migration of the medulla, which are unintelligible in the adult organ unless viewed in the light of their formation.

The framework of the adrenal is made up of reticulum which can be studied best by some of the destructive methods. The reticulum fibrils have a definite arrangement in relation to the cells and blood-vessels, which they support and hold in position. Finally, the architecture of the adrenal is described most fully from the conditions found in the dog, where such variations of structure as transposed cortex or misplaced medulla are explained by the ingrowth of the medulla as followed in the organogenesis of the gland in a series of embryo pigs.

VI.

Specific Degenerations of the Cortical Arteries. By HENRY J. BERKLEY, M. D., Clinical Professor of Psychiatry, The Johns Hopkins University. (Pages 231 to 236.)

VII.

The Regeneration of the Crystalline Lens. (Alvarenga Prize Essay, 1899.) By ROBERT L. RANDOLPH, M. D., Baltimore. With 6 figures in the text. (Pages 237 to 263.)

The subject attracted the attention of investigators seventy-five years ago. Since then several have busied themselves with the problem, but within the past thirty years nothing of note has appeared in connection with it. It is surprising to see that a histological problem of such importance finds no mention in either works on anatomy or ophthalmology. The object of this work is to ascertain whether the lens of the rabbit is regenerated after its extraction—whether, in other words, a new lens is formed. The conclusions are as follows:

1. Regeneration of the lens in the rabbit's eye occurs *only when some portions of the lens are left behind at the extraction.* 2. Removal of the lens in capsule is followed by a negative result. 3. Panophthalmitis is followed by a negative result. 4. The volume of the regenerated lens may be equal to that of the original lens. 5. The regenerated mass is lenticular, though sometimes it is ring-shaped and at other times it is semilunar. 6. The reason why positive results occur so much less frequently than negative ones, is because we are unable to protect the animal from infection after the operation. 7. Theoretically one would suppose that the longer the animal were allowed to live the greater would be the volume of the regenerated mass. This, however, was not the case in these experiments. In one instance where an animal was killed fifteen months after the extraction of its lens, the regenerated lens was about equal in size to that seen in another case where the rabbit was killed after six weeks. It may be added that there was no apparant reason for this. 8. A *mild* iritis, lasting for a week or ten days after the operation, is conducive to a successful result. This may be explained by the increased vascularity of the parts which lie next to the lens.

The second portion of the paper is devoted to a consideration of the works of Wolff and Erik Müller. The former made the statement that the lens of the triton (salamander) is regenerated from the iris epithelium and Müller confirmed Wolff's results. The author made fresh observations and reaches the following conclusions: 1. In the case of the newt, extraction of the lens is followed by its regeneration. 2. Regeneration occurs even when the lens has been removed in its capsule, so that the new lens must take its origin from tissue having a different physiological value; and, as the experiments of Wolff have shown, this structure is the iris.

VIII.

The Histology of Acute Lobar Pneumonia. By JOSEPH H. PRATT, M. D., Boston. With 1 plate. (Pages 265 to 277.)

Early in the disease the alveoli contain many cells almost identical in appearance with the so-called transitional cell of the blood. They are usually slightly larger than the polynuclear leucocyte, and contain an irregular vesicular nucleus, surrounded by a rim of protoplasm, containing either a few granules or none at all. In a case in which death occurred eleven hours after onset, there were great numbers of these cells in the exudate and no polynuclear leucocytes.

Large phagocytic cells are found in all stages of the disease, but in greatest number in gray hepatization. The inclusions consist chiefly of polynuclear leucocytes and lymphocytes, more rarely of red blood-corpuscles. These phagocytic cells probably play an important part in resolution. Similar cells are found in the lymphatics, in the pleural exudate, and in the bronchial lymph nodes.

The fibrin is not formed by a degeneration of the alveolar epithelium, but comes exclusively from the exuded blood plasma.

The lymphatics are involved late in the disease. There is proliferation of their endothelium, and they become distended with cells, serum and fibrin.

Early in the disease there is no infiltration of the interstitial

tissue. In cases dying during the second week, there is often a great infiltration with lymphoid and plasma-cells. As a rule the longer the duration of the disease the greater the number of plasma-cells.

These results are based upon a study of fifty cases of typical lobar pneumonia.

IX.

Bilateral Cholesteatomatous Endotheliomata of the Choroid Plexus. By GEORGE BLUMER, M. D., Director of the Bender Hygienic Laboratory, Albany, N. Y. With 1 plate. (Pages 279 to 289.)

X.

Concerning the New Formation of Elastic Fibres, Especially in the Stroma of Carcinomata. By HERBERT U. WILLIAMS, M. D., Professor of Pathology and Bacteriology, Medical Department, University of Buffalo. (Pages 291 to 296.)

Our knowledge of the condition of the elastic fibres in normal and pathological tissues has recently been much improved by the discovery of selective staining processes. Weigert's method was used by the writer with most satisfactory results. A review of the literature of the subject shows that newly formed elastic fibres have been found in the intima of the arteries in arteriosclerosis and endarteritis, in chronic productive inflammations of the serous membranes, in cirrhosis of the liver, in chronic interstitial nephritis, and in certain scars and tumors of the skin.

The writer endeavored to determine whether newly formed elastic fibres constituted a part of the stroma of carcinoma. Thirty-seven carcinomata growing in various organs were studied, with the following conclusions:

1. When the stroma of carcinoma is itself of new formation it is usually free from elastic fibres.

2. Newly formed elastic fibres may occur in the stroma, though rarely, and they are likely to be fine in quality and small in number.

3. The tumors, in which newly formed elastic fibres occurred, either contained a large amount of connective-tissue stroma, or the newly formed elastic fibres were in connection with preexisting elastic elements of the original parts.

XI.

Cirrhosis of the Liver of the Guinea-Pig Produced by a Bacterium (Bacillus Coli Communis) and Its Products. By GEORGE H. WEAVER, M. D., Assistant Professor of Pathology, Rush Medical College, Chicago. With 2 figures in the text. (Pages 297 to 305.)

The injurious agents which act acutely upon the liver affect the cells of the liver and bile-ducts, the character and strength of the agent determining the degree of injury produced. Only two substances which act in a chronic manner stimulate the growth of connective tissue. An important factor in determining the effects of injurious agencies upon the liver is to be found in the peculiarities of the tissues of the individual. The organism studied belongs to the group of colon bacilli. The live cultures and those which had been devitalized by heat when injected into guinea-pigs produced extensive cirrhoses in the liver of the animals. The early changes were in the form of necrosis, the connective-tissue proliferation following a little later.

XII.

On the Muscular Architecture and Growth of the Ventricles of the Heart. By JOHN BRUCE MACCALLUM, Baltimore. With 24 figures in the text. (Pages 307 to 335.)

By the study of embryonic hearts of various ages, macerated in nitric acid, the organ was found to consist of several layers of muscle, the course of which is described in some detail. Nearly all the fibres begin in the auriculoventricular ring of one ventricle, and end in the papillary muscles of the other. Those fibres which begin near the outside of one ventricle end near the inside of the other ventricle. The thin superficial layers being removed, the left ventricle can be unrolled so that its cavity and papillary muscles are exposed. This shows it to be a flat band of muscle continuous with the muscle fibres that cross over in the septum from the right ventricle. Grouping these layers together it is clear that the heart in the embryo is a scroll-shaped band of muscle with tendons at each end. As it grows older the layer of muscle passing over in the septum remains comparatively thin, while the ventricular walls increase greatly in thickness. The growth takes place mainly near the inside of the ventricular walls, as shown by the presence of karyokinetic figures near the endocardium and by the fact that the muscle-cells in this situation are younger in an actively growing heart than those near the surface of the organ. These growing points must therefore be at the two ends of the unrolled heart. The heart, then, resolves itself into a flat band of muscle with a growing point at either end.

XIII.

Some Observations upon the Anatomy of the Gall-Bladder and Ducts. By GEORGE E. BREWER, M. D., Assistant Demonstrator of Anatomy, College of Physicians and Surgeons, New York. With 5 plates and 50 figures in the text. (Pages 337 to 354.)

In this paper are given the results of 160 dissections of the gall-bladder region in the adult human subject, which were carried out during the years 1898–99 at the anatomical laboratory of the College of Physicians and Surgeons (Columbia University), New York. These observations were originally undertaken by the writer with a view to familiarizing himself with the normal relations of the structures in this vicinity, and of perfecting his technique in handling and suturing them. Noting numerous variations from the normal, and certain rather striking abnormalities which were of decided surgical interest, the writer extended his studies far beyond the limit originally intended. In addition, numerous observations were made on the size of the gall-bladder, the length and calibre of the ducts, the surgical relations of the duodenal orifice of the common bile-duct, and an effort was made to establish certain landmarks by which it may be rapidly located through an incision in the duodenum. Observations were also made with a view to establish landmarks by which the operator could rapidly locate and accurately mark out

the position of the principal nerve-trunks likely to be injured by an incision through the abdominal wall in this region. In this paper are also included observations upon the distribution of the hepatic artery, which are illustrated by fifty figures of actual dissections, showing numerous variations and many anomalies of interest to surgeons who are accustomed to operate in this region.

XIV.

A Case of Plexiform Neuroma of the Eyelid (Rankenneuron). By HARRY FRIEDENWALD, M. D., Associate Professor of Ophthalmology, College of Physicians and Surgeons, Baltimore. With 2 plates. (Pages 355 to 357.)

The patient, female, was 16 years of age. The abnormality was first noticed when she was a few months old. Two operations had been performed when she was a child. The right upper lid was greatly hypertrophied, especially in its temporal part; the lower lid but slightly affected. There was almost complete ptosis and the thickness of the lid was greatly increased. Firm, round and corded masses could be felt under the skin and could be followed back into the orbit.

At the operation fine white threads characteristic of the growth were found and removed. The growth was easily freed from the orbit with a blunt instrument and was found to extend much deeper into the orbit than was expected. The tumor was found to consist in great part of masses of whitish fibres varying greatly in thickness and weighing seven grammes. Sections showed the characteristic appearance of neuromata. Everywhere there were found smaller and larger nerve bundles imbedded in a framework of connective tissue. Some—for the most part smaller—bundles showed nothing abnormal. Others again presented varying degrees of hyperplasia of the endo- and perineurium with the nerve elements placed more or less centrally, or with a few scattered axis cylinders in the periphery. There were other bundles again in which the hyperplasia was still greater, and in which it was difficult to recognize any nerve elements whatever.

XV.

A Case of Multiple Myeloma. By JAMES H. WRIGHT, A. M., M. D., Pathologist to the Massachusetts General Hospital, Boston, Mass. With 3 plates. (Pages 359 to 366.)

XVI.

The Development of the Musculature of the Body-Wall in the Pig, including its Histogenesis and Its Relations to the Myotomes and to the Skeletal and Nervous Apparatus. By CHARLES RUSSELL BARDEEN, M. D., Associate in Anatomy, The Johns Hopkins University. With 10 plates. (Pages 367 to 399.)

The investigation considers the development of the intrinsic thoraco-abdominal musculature from the myotomes in the pig's embryo. The histological changes taking place in the musculature are described, as well as the early relations of the musculature to the nervous and skeletal apparatus.

Three periods are recognized in the development of the musculature:

1. The period during which the myotomes expand dorsally and send ventral processes into the *membrana reuniens*. The cells, both of the mesial and the lateral plates of the myotomes are shown to be converted into muscle-fibres.

2. The period during which the tissue of the myotome, becomes utilized in the formation of the muscles characteristic of the adult. Segmentation is shown to persist only where the muscle-tissue remains throughout united to the vertebræ or to the ribs. The peripheral nerves are shown to develop independently of the myotomes, and to become associated directly with the musculature only after the muscles have become differentiated.

3. The period during which the muscles expand, become perfected in internal structure and are shifted into the relative positions characteristic of the adult.

Cell-multiplication takes place during the first two periods and during the early part of the third. Cell-division takes place by mitosis in round undifferentiated "myoblasts." From these the muscle-cells are developed by elongation of the cell-body, nuclear multiplication by direct division, and fibrillar differentiation of the protoplasm. The differentiated muscle-cells do not divide to form new cells. During the third period, however, many of the muscle-cells undergo retrograde metamorphosis.

XVII.

A Rare Variety of Adenocarcinoma of the Uterus. By THOMAS S. CULLEN, M. B., Associate in Gynecology, The Johns Hopkins University. With 3 figures in the text. (Pages 401 to 407.)

In the uterus we have three distinct varieties of epithelium: the squamous epithelium of the vaginal portion, the very high cylindrical pale-staining epithelium lining the cervical canal and the racemous glands, and the cylindrical ciliated epithelium of the body. From these three distinct kinds of epithelium three definite varieties of carcinoma develop. And, in fact, nearly all carcinomata of the uterus may be classified under one of the three varieties:

(1) Squamous cell carcinoma of the cervix.
(2) Adenocarcinoma of the cervix.
(3) Adenocarcinoma of the body of the uterus.

The accompanying case differs materially from any that we have yet seen. Clinically, it is interesting to note the advanced age of the patient, who was 76 years old. There had been no hæmorrhages at any time and notwithstanding the extent of the growth the symptoms were of only one year's duration. On examining Figure 1, one is immediately impressed with the uniform involvement of the entire uterine cavity, the body being equally as much implicated as the cervix. The surface also presents dome-like elevations instead of the papillary or tree-like growths so common both in adenocarcinoma of the cervix and body. Another marked feature is, that notwithstanding the advanced age of the patient, the uterus is the size of a three-months pregnancy.

On histological examination the growth is found to be glandular in type. These glands are large and lined by one layer of high cylindrical epithelium, the nuclei of which rest directly on the basement membrane and the gland-cavities contain a homogeneous material that takes the hæmatoxylin

stain. In other words, both the glands and their contents resemble those found in the cervix.

XVIII.

A Bacteriological and Microscopical Study of over Three Hundred Vesicular and Pustular Lesions of the Skin with a Research upon the Etiology of Acne Vulgaris. By T. Casper Gilchrist, M. D., Clinical Professor of Dermatology, The Johns Hopkins University. With 1 plate. (Pages 409 to 430.)

Stained smears were examined from every lesion. A summary of the results is as follows:

Impetigo Contagiosa.—From every one of the 17 cases examined the streptococcus pyogenes was obtained, and in ten cases it was in pure culture. In 7 cases the staphylococcus pyogenes aureus also grew. The disease was reproduced in three cases by inoculating with a pure culture of the streptococcus obtained.

Ecthyma.—Two cases yielded pure cultures of streptococcus pyogenes.

Staphylococcia or Folliculitis Staphylogenes.—Sixteen cases examined: two cases yielded pure cultures of streptococcus pyogenes; in five cases the S. pyogenes albus was also present; in seven patients the S. pyogenes aureus was present in pure culture.

Tricophytosis.—In a case of tinea barbæ one culture yielded a pure growth of tinea megalosporon ectothrix, whereas in the second culture the S. pyogenes aureus was also present. By inoculation experiments on two men it was proved that the fungus was pyogenic and that therefore the pustular lesions of tinea barbæ may be produced by the fungus alone without the presence of the ordinary pus organisms. The same results were proven in a case of tinea circinata where pustules were present and a pure culture of the tinea magalosporon endothrix was obtained. It was also shown that the same fungus was the cause of pustular lesions on a boy's scalp.

Furunculosis.—From 20 cases pure cultures of the S. pyogenes were obtained in every case.

Scabies.—Nine cases; the staphylococcus pyogenes grew in pure culture in 4 cases; in 2 cases the S. pyogenes aureus was also present; the albus being present alone in the ninth case.

From beneath scales of pediculosis capitis and corporis, cultures of streptococcus pyogenes and S. pyogenes aureus and albus usually combined.

The S. pyogenes aureus grew in pure culture from 3 cases of sycosis vulgaris.

The pustular lesions of syphilis were shown, with two exceptions, to be due to mixed infections of the streptococcus and S. pyogenes aureus and albus.

Cultures were negative in 10 cases of herpes zoster (vesicles), 2 cases of sebaceous cyst, 15 cases of dermatitis venenata (vesicles), 4 cases of pernio (vesicles), 3 cases of erythema multiforme (vesicles), and one case of pemphigus pruriginosus.

Eczema.—Nineteen cases; in cultures from 6 vesicles, 5 were sterile, while one showed the S. pyogenes albus. In 13 cases of eczema madidans, 5 gave the staphylococcus pyogenes aureus alone, 4 yielded the albus, and 2 were sterile after wiping the surface of the lesions. Out of 10 cases of pustular eczema, 2 gave the S. pyogenes aureus, 4 showed the albus, 2 cases yielded both aureus and albus, and one was sterile.

Acne Vulgaris.—This yielded the best results. 96 lesions from 54 patients were examined. 54 cultures were sterile; 31 showed from one to many colonies of staphylococcus pyogenes albus; 11 cultures gave pure growths of a bacillus in glycerin-agar. All the smears from the pus showed bacilli. This bacillus grew slowly en masse in glycerin agar. The colony at first was creamy white, later it became pinkish, then almost black in one very old culture. It grew on glucose-agar without forming gas; grew in bouillon; invisibly on potato; grew fairly well on blood-serum, but not in Dunham's or milk. It did not decolorize by Gram's stain, was motile and branched. It killed mice and guinea-pigs. Bacillus acnes was the name suggested for this micro-organism.

XIX.

The Frequency and Significance of Infarcts of the Placenta, Based upon the Microscopic Examination of 500 Consecutive Placentæ. By J. Whitridge Williams, M. D., Professor of Obstetrics, The Johns Hopkins University, and Obstetrician-in-Chief to The Johns Hopkins Hospital. With 3 plates. (Pages 431 to 460.)

XX.

A Contribution to the Knowledge of the Bacillus Aërogenes Capsulatus. By W. T. Howard, Jr., M. D., Professor of Pathology, Western Reserve University, Cleveland, Ohio. With 1 plate. (Pages 461 to 495.)

After a review the author reports thirteen cases of gas-bacillus invasion, which he divides into three groups:

Group I. Bacilli entering the body through the genito-urinary tract—two cases. In one there were cerebrospinal meningitis and brain abscesses, both containing gas-cysts and general gaseous emphysema due to B. aërogenes capsulatus. In the second case, with abscess of the prostate, chronic cystitis, pyonephritis and gaseous emphysema, the bacillus was concerned in the renal lesions.

Group II. Bacilli entering through the biliary tract—two cases. In one the gas bacilli were limited to the gall-bladder and liver, and in the other—a case of typhoid fever—there was general gaseous emphysema, best marked in the liver and biliary tract.

Group III. Bacilli entering through lesions of the stomach and intestines,—nine cases, comprising the following lesions as the portal of entry: strangulated hernia; necrosis of the stomach with gas blebs (typhoid fever); crushing injuries, involving the gastro-intestinal tract; intestinal ulcers (typhoid, two cases, lymphosarcoma, one case); and post-mortem disintegration of the stomach and ileum (four cases).

In the last four cases, microscopically, there were no gas-cysts found in the gastro-intestinal tract, which on microscopical examination showed both cysts and bacilli.

The author next discusses the various modes of invasion, the destruction of the bacilli in the body and their effect upon the lesions.

XXI.

The Intravascular Growth of Certain Endotheliomata. By W. G. MACCALLUM, Associate in Pathology, The Johns Hopkins University. With 1 plate and 4 figures in the text. (Pages 497 to 510.)

The writer, after reviewing the records of several similar cases in the literature, gives the clinical history and autopsy protocol of a case which occurred at The Johns Hopkins Hospital. The tumor of the testicle was incompletely extirpated and at the autopsy, several months later, the extension along the spermatic vein could be traced into the vena cava, filling it with translucent papillary masses which extended into the heart. Large metastatic nodules were found on lungs, liver and elsewhere. The tumor was shown to spring from spaces with endothelial lining thought to be the lymphatic spaces. The proliferation of these cells produced not only cyst-like cavities but complicated cell masses. Especial interest attached to the relation of the tumor to the blood-vessels, as the intravascular papillary masses generally hung free in the blood, and were overgrown by the endothelium of the vessel.

XXII.

The Cultivation of Amœbæ. By CASPER O. MILLER, M. D., New Market, Va. (Pages 511 to 523.)

Cultures were made in sterilized Erlenmeyer flasks with water containing a small percentage of organic matter. In all of the cultures living bacteria were present.

The fact that encysted amœbæ withstand drying was taken advantage of to eliminate from the cultures those protozoic forms which do not withstand drying. Algæ were eliminated by excluding the light from the cultures.

The amœbæ were gathered from various sources; of these some have been cultivated since 1889. Some cultures containing encysted amœbæ have been dried for six years without killing the amœbæ. Some of the amœbæ cultivated did not encyst. Of those encysting, two varieties have been studied: one forming spherical cysts—A. Sphærocystis; and the other forming irregularly shaped cysts—A. Irregularia.

In the culture of A. Sphærocystis, oval cysts resembling coccidiæ in many respects are found at times, and there are also occasionally present sharply defined, consecutive bodies.

Although it is not proven, at the same time it is questioned whether Amœbæ Sphærocystides, coccidiæ and the crescents, are not phases in the development of the same organisms. Those who have cultivated amœbæ on solid media only describe them as muliplying by division, but in the fluid cultures there are appearances which seem to indicate that amœbæ also multiply by segmentation.

XXIII.

The Bacillus Pseudo-Tuberculosis Murium; Its Streptothrix Forms and Pathogenic Action. By DOROTHY M. REED, Baltimore. With 1 plate. (Pages 525 to 541.)

A study of the B. pseudo-tuberculosis murium first isolated by Dr. Welch in 1894; described by Kutscher in Germany in 1806; recovered in Baltimore in 1897, from a spontaneous case of pseudo-tuberculosis in a mouse.

This paper deals with the cultural properties of the organism, previously undetermined, with the study of the conditions under which the organism varies from its usual form of a simple rod in giving off side branches, and with the nature of the pathological lesions on the animal body. It is shown that the bacilli branch in the body and in artificial media; and that in the body aggregations of bacilli appear, which resemble the "Drüsen" of actinomyces. In the tissue lesions the nodules differ from true tubercles, in being composed of bacteria and not of proliferated or emigrated body-cells.

XXIV.

Experimental and Surgical Notes upon the Bacteriology of the Upper Portion of the Alimentary Canal, with Observations on the Establishment There of an Amicrobic State as a Preliminary to Operative Procedures on the Stomach and Small Intestine. By HARVEY CUSHING, M. D., Associate in Surgery, The Johns Hopkins University, and LOUIS E. LIVINGOOD, M. D., Late Associate in Pathology, The Johns Hopkins University. With 8 figures in the text and 1 diagram. (Pages 543 to 591.)

From numerous clinical observations upon the character of the peritonitides consequent to perforating wounds of the alimentary canal it seemed probable that the severity of the infection bore a distinct relation to the situation of the perforation and that the favorability of the prognosis was proportionate to the nearness of the lesion to the stomach.

This suggestion, originating from clinical data alone, was the occasion of a series of experimental observations upon animals and human beings relative to the bacteriological features of the alimentary canal, especially of its upper portion. A great scarcity of micro-organisms was found to be the invariable rule in the neighborhood of the duodenum of the 35 dogs and rabbits which were examined under varying dietary conditions. With certain precautionary measures, such as sterilization of the ingesta and a fast of a few hours, a condition of amicrobism could almost without exception be brought about in the stomach and upper portion of the intestine of a healthy animal.

Adaptation to surgical procedures of the principles established by this experimental work has shown the feasibility, under a certain dietary régime, of rendering the upper portion of the alimentary canal practically free from micro-organisms in anticipation of operative work on the stomach and upper intestine, so that exposure of the lumen of the canal is unattended by risks of ensuing peritonitis.

XXV.

The Origin, Development and Degeneration of the Blood-vessels of the Human Ovary. By JOHN G. CLARK, M. D., Professor of Gynecology, University of Pennsylvania. With 5 plates and 11 figures in the text. (Pages 593 to 676.)

The author contributes a special research upon the ovarian circulation, in which the normal distribution of the arteries and veins of the ovary and their relationship to each other have been studied. At first sight the solution of this question did not appear to present greater difficulties than those en-

countered in the ordinary course of any research. A review of the sections of a few injected adult ovaries, however, at once demonstrated the futility of attempting to draw any conclusions from this source; for the close crowding together of the parallel vessels of the medullary portion, and the markedly irregular course of those in the cortex, or follicle bearing zone, rendered impossible any accurate observations concerning the relative number and distribution of the veins and arteries and the exact course followed by each system.

With a view, therefore, of securing ovaries possessing a simpler scheme, a study was made of the lower animals, such as the dog, rabbit, guinea-pig, sheep and pig, but with unsatisfactory results, and only after the injection of the generative organs of a monkey was a suggestive clue secured. Beyond this point, however, it was difficult to proceed; and only after the injection of a very large series of ovaries from individuals, ranging in age from a six-months fœtus to a woman many years beyond the menopause, were final conclusions reached.

In the search for this normal scheme through an extensive number of serial sections, various questions directly dependent upon the circulation presented themselves for solution, which widened the scope of this work until it developed into a composite anatomical and physiological research.

Thus, the various vital phenomena have been considered which transpire within the follicle from its embryological origin and progressive growth to the time of its disappearance, either through an obliterative process or through its rupture, organization as a corpus luteum, and final retrogression as a corpus fibrosum. In this connection the author has advanced theories concerning the development of the ovary; the differential signs of sex; the descent of the ovary; the cause of ovulation; the synchronism of ovulation and menstruation; the mechanism of the rupture of the mature follicle, and the final cessation of ovulation; which have been based upon observations made in the study of a very large number of sections.

Soon after beginning this work he was struck not only with the difficulty of arriving at a definite knowledge of the scheme, but also of determining the age at which this scheme may be taken as a standard for comparison.

This is certainly not possible after active ovulation is established; for the constant changes in the vascular system, induced through the maturation, rupture and organization of the follicle, introduce an element of variability into the circulation of this organ which occurs in no other.

Failing to reach any satisfactory starting point in the adult, the author next studied the ovary of a girl approaching puberty, but with little more success, for it was found that almost as constant variations occur in the follicular circulation before as after the inauguration of ovulation. In the hope of finally reaching a period in the life of the female individual at which a definite standard for comparison might be found, numerous specimens from children of various ages were injected and closely studied. Finally, the ovary of a six-months fœtus was obtained, which furnished a definite clue to the arrangement of the vessels; but as the follicular apparatus was still in process of development, a new-born child in which the tunica albuginea was well formed was selected as the standard. Even here the solution of the question was not easy, for in order to trace the ramifications of the vessels from the point of their entrance into the ovary to their ultimate termini the study of the serial sections of many ovaries was necessary.

XXVI.

The Gonococcus. A Report of Successful Cultivations from Cases of Arthritis, Subcutaneous Abscess, Acute and Chronic Cystitis, Pyonephrosis and Peritonitis. By Hugh H. Young, M. D., Instructor in Genito-Urinary Diseases, The Johns Hopkins University. (Pages 677 to 707.)

This report represents a study of unusual infections of the gonococcus occurring at The Johns Hopkins Hospital during the past four years.

Gonorrhœal arthritis is first considered, and a complete tabulation is given of ten cases in which pure cultures of the gonococcus have been obtained from diseased joints.

Five cases of subcutaneous abscesses due to the gonococcus are presented, together with a careful review of the literature showing the great rarity of such cases.

A case of general suppurative peritonitis, in which the gonococcus alone was grown from the peritoneal exudate, being the only case on record, is detailed.

In the discussion of gonococcus cystitis, a review of the literature shows that only two cases of acute cystitis in which the organism of Neisser was obtained in pure culture, and one case where by aspiration of the bladder pure cultures of the gonococcus were obtained from the urine, are recorded. In others it was found on coverslip preparations.

A case of chronic alkaline cystitis of four years' duration, due to the gonococcus alone, is presented as the first case in the literature, and the occurrence of a double pyonephrosis in the same case, due to the same organism, and likewise the first recorded instance, is mentioned.

The literature of kidney affections following gonorrhœa is reviewed at length, and a historical résumé of the successive demonstrations of the widespread infective powers of the gonococcus is appended.

XXVII.

The Histogenesis of the Cellular Elements of the Cerebral Cortex. By Stewart Paton, M. D., Assistant in Clinical Neurology, The Johns Hopkins University. With 7 figures in the text. (Pages 709 to 741.)

XXVIII.

Experimental Pancreatitis. By Simon Flexner, M. D., Professor of Pathology, University of Pennsylvania, Philadelphia. (Pages 743 to 771.)

The study upon which this paper is based consists of a series of experiments carried out upon dogs in which injections of acids, alkalies and other chemicals, as well as bacterial cultures, have been made into the duct of Wirsung and the interstitial tissue of the pancreas. By the several procedures employed, hemorrhagic, suppurative, necrotizing and chronic indurative pancreatitis have been produced. There has been frequently associated with these conditions fat-necrosis both in the peritoneal cavity and in the distant fat. The several forms of pancreatitis produced have been considered in their relation

to pancreatitis in human beings. The histology of the lesions is also described and a comparison is drawn between the changes found in the experimental cases and those described in similar lesions in human beings. Attention has been paid to the cause of fat-necroses with the determination that in all of them the fat-splitting ferment in quantities demonstrable by chemical test existed.

XXIX.

Chronic Hypertrophic Gastritis of Syphilitic Origin, Associated with Hyperplastic Stenosis of the Pylorus. By JOHN C. HEMMETER, M. D., Clinical Professor of Medicine, University of Maryland, and WM. ROYAL STOKES, M. D., City Bacteriologist, Baltimore. With 4 figures in the text. (Pages 773 to 794.)

The most important pathological changes noted in cases of gastric syphilis are ulceration, necrosis, and atrophy of the mucous membrane of the stomach, with a marked chronic interstitial increase of the connective tissue of the submucous coat. Large fibrous bands also extend into the muscular coat of the organ.

The case which the authors of this article report, gave a typical history of syphilis. The patient showed an absence of free and combined HCl, and pyloric stenosis was suspected. A surgical operation was performed for relief of the symptoms, and the patient died one month later.

An autopsy showed general infection with the bacillus pyocyaneus and staphylococcus aureus, and the stomach was found shrunken to about one-third of its natural size. There was marked pyloric obstruction, without tumor or ulcer. The submucous coat was thickened and the mucous membrane coarsely granular in appearance.

A microscopic examination showed atrophy of the glands of the mucous membrane, with the formation of villous-like projections, or diffuse formation of young fibrous tissue. The submucosa shows a marked thickening due to the presence of fibrous tissue with many areas of lymphoid cells, especially about the smaller veins.

This fibrous tissue extended to the muscular coat, and in places the peritoneum was thickened. The blood-vessels showed multiplication of the intimal cells but no other marked changes. These changes were more marked at the pylorus, but were apparent in sections taken from various portions of the organ.

The history of the case and the changes described justify the belief that the entire pathological process in the stomach was syphilitic in character.

XXX.

A Case of Adenocarcinoma which Originated in the Submucous Glands of a Trachea-Like Formation, Found in a Sacral Teratoma. By WILLIAM H. HUDSON, M. D., La Fayette, Ala. With 2 plates. (Pages 795 to 804.)

A case of adenocarcinoma which developed from the submucous glands of a trachea-like formation found in a sacral teratoma is reported.

Among the fœtal structures found in the teratoma were the trachea, the œsophagus, the posterior spinal ganglia, and other structures resembling normal physiological tissues.

The special interest in this communication centres in the malignant changes which were found to exist in the tumor. Reported cases of malignancy in teratomata are exceedingly rare, by far the largest number of such cases being of the epidermal type. The case here reported, and one other, are all the reported cases of teratomata in which malignancy has originated from glandular structure.

The surgery of teratomata is also considered, and the removal of these tumors is advised in every case, where such operations can be performed with safety to the patient.

XXXI.

On Hydromyelia in Its Relation to Spina Bifida and Cranioschisis. By E. BATES BLOCK, M. D. With 3 plates. (Pages 805 to 858.)

XXXII.

Experimental, Disseminated Fat-Necrosis. By EUGENE L. OPIE, M. D., Assistant in Pathology, The Johns Hopkins University, Baltimore. With 1 plate. (Pages 859 to 876.)

The relation of fat-necrosis to lesions of the pancreas was studied experimentally in cats. If the outflow of pancreatic secretion is completely obstructed by ligating both pancreatic ducts, foci of fat-necrosis are produced and may be widely disseminated. In two instances, in which the animals lived twenty-five and twenty days after the operation, almost the entire abdominal fat was opaque-white and necrotic, and foci of necrosis were found in the subcutaneous and pericardial fat. The presence of a fat-splitting ferment was demonstrated in the necrotic fat. In other instances, in which the animals lived a shorter time, less extensive necrosis resulted. Assuming that after duct-ligation a gradual diffusion of pancreatic juice or of the fat-splitting ferment occurs, the attempt was made to hasten the diffusion by stimulating, after ligation of the ducts, the secreting activity of the gland with pilocarpin. After the death of the animal extensive necrosis of the abdominal fat with foci in the pericardium was found. To test the ability of the fully formed pancreatic juice to cause necrosis of fat the duodenal end of the organ was transplanted in such a way that the secretion was poured into the subcutaneous tissue of the abdominal wall; typical fat necrosis resulted.

The condition essential to the production of focal fat-necrosis is the penetration of the fat-splitting ferment of the pancreas into living fat, and the lesions of the pancreas associated with fat-necrosis are such as permit this diffusion into the surrounding tissue. The widespread necrosis occasionally observed in man and in animals may be reproduced experimentally by conditions which favor diffusion of the ferment.

XXXIII.

Multiple Hyperplastic Gastric Nodules Associated with Nodular Gastric Tuberculosis. By CLARIBEL CONE, M. D., Professor of Pathology, Woman's Medical College, Baltimore. (Pages 877 to 890.)

The report is of a case of tuberculosis of the stomach occurring in the course of a general miliary turberculosis, which came to autopsy in the pathological laboratory of The Johns

Hopkins Hospital in October, 1898. Besides the tuberculous infection of the stomach, gastric lesions of unusual character were also found.

From the surface of the stomach projected numerous small granules and occasional larger rounded nodules, varying in size from that of a pin-head to that of a pea.

Upon microscopic examination these nodules presented several histological types. There were (1) nodules due to connective-tissue overgrowth or to irregular fibrous contraction; (2) atypical glandular nodules; (3) nodules specifically tuberculous.

The connective-tissue nodules are doubtless a feature of chronic gastritis which was present. The atypical glandular nodules possess in part the features of a neoplasm; in part, the features of a simple hyperplastic growth.

Glandular hyperplasia seems more probable because there are present in the same mucous membrane simple proliferating gastric tubules, irregular groups of two, three or more tubules, larger irregular collections, and the circumscribed nodules themselves, all having a similar general structure, and all, no doubt, an expression of the same pathologic process.

The tuberculous nature of some of the nodules has been shown beyond question by both the histologic and the bacteriologic examination.

Between the tubercles and the hyperplastic glandular nodules no direct relation can be traced.

XXXIV.

On Serum Substitutes with Special Reference to Asiatic Cholera. By ARTHUR BLACHSTEIN, B. A., M. D. (Pages 891 to 901.)

XXXV.

Endocarditis Due to a Minute Organism, Probably the Bacillus Influenzæ. By MABEL F. AUSTIN, Baltimore. (Pages 903 to 911.)

In three cases of endocarditis which have come to autopsy, a minute bacillus was found which differs from any of the bacteria previously described as the cause of the disease.

The bacillus is identical in its peculiar morphological characteristics with the B. influenzæ of Pfeiffer. Cultures were not obtained. The organism is very minute. It stains with the basic anilin dyes, but rarely uniformly; usually the poles of the bacillus take the stain more intensely, giving the appearance of a diplococcus. When treated by Gram's method the bacillus is readily decolorized. Great numbers of the organisms were found in the coverslip preparations made from the diseased valves, and in sections of the recent vegetations, and in one case clumps of bacilli were found also in the lung alveoli. No other micro-organisms were present.

While the failure to obtain cultures forbids definite conclusions as to the nature of the organism, it seems very probable from the evidence obtained that the bacillus is the Bacillus influenzæ. This is of especial interest in connection with the many clinical reports of endocarditis occurring as a complication of influenza. The clinical histories of the three cases are given with the histological and bacteriological studies of the tissues obtained at autopsy. A brief review of the literature bearing on the subject is presented.

XXXVI.

On a Case of Chronic Nephritis Terminating with Symptoms of Landry's Paralysis. By LEWELLYS F. BARKER, Associate Professor of Pathology, The Johns Hopkins University. (Pages 913 to 923.)

The paper records a case of chronic diffuse nephritis which for two weeks before death presented the symptoms of acute ascending paralysis. At autopsy there were small red granular kidneys; an acute terminal hæmorrhagic colitis due to the streptococcus pyogenes was present. The microscopic examination of the spinal cord and brain revealed lesions in the nerve-cells and in the blood-vessels. The lumbar cord was most affected, but there were alterations as high as the cerebral cortex. Not only were the motor-cells involved but alterations were also met with in the nerve-cells of the nuclei of the dorsal funiculi in the medulla oblongata.

XXXVII.

Model of the Medulla, Pons and Midbrain of a New-Born Babe. By FLORENCE R. SABIN, Baltimore. With 8 plates and 52 figures in the text. (Pages 925 to 1045.)

The article contains a description of a model of the medulla, pons and midbrain of a new-born babe made after the wax-plate method of Born. It was prepared from a series of horizontal sections stained by the method of Weigert-Pal, and it reproduces in three dimensions, the various structures of the region so magnified that they can be seen and easily handled. The model, moreover, can be taken apart completely.

The model illustrates the form and position of each tract, the course of development being thereby suggested. The fact that the medial and lateral lemnisci which form the main sensory tracts are closely related in form to the other structures, while the pyramidal tract has but little or no influence in moulding the other parts, is emphasized.

The cerebral nerves and their nuclei are described and grouped according to their position and form, and these groups also illustrate the course of development. The most curious and interesting form, perhaps, met with in the model is that of the inferior olivary nucleus, its gyri and sulci being clearly indicated. The relation of the medulla oblongata to the spinal cord is also illustrated. The mode in which the white and gray matter continue into the medulla, the changes these undergo and the intrinsic structures of the medulla, pons and midbrain are in turn considered.

XXXVIII.

A Contribution to the Surgery of Foreign Bodies. By WILLIAM S. HALSTED, Professor of Surgery, The Johns Hopkins University. With 3 plates and 1 figure in the text. (Pages 1047 to 1059.)

DESCRIPTION OF THE JOHNS HOPKINS HOSPITAL.

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SUMMARIES OR TITLES OF PAPERS BY MEMBERS OF THE HOSPITAL AND MEDICAL SCHOOL STAFF APPEARING ELSEWHERE THAN IN THE BULLETIN.

THOMAS MCCRAE, M. B. Spleno-Myelogenous Leukæmia; with Disappearance of the Spleen Tumor and of the Myelocytes from the Blood.—*The British Medical Journal*, March 31, 1900.

The patient, whose case is reported, came under observation twice in one year, with typical signs of spleno-myelogenous leukæmia. On each occasion the spleen tumor gradually disappeared, the leucocytes returned to normal and the myelocytes disappeared. He ultimately died, apparently of cerebral hæmorrhage. No similar case was found in the literature, although instances of disappearance of one of these conditions named are not uncommon.

HUGH H. YOUNG, M. D. The Present Status of the Appendicitis Question, as Shown by the Recent Literature and Society Transactions of France, Germany, England, and the United States.—*Maryland Medical Journal*, April, 1900.

THOMAS R. BROWN, M. D. Progress in Pediatrics.—*Maryland Medical Journal*, April, 1900.

ANDREW H. WHITRIDGE, M. D. Can Beginning Pulmonary Tuberculosis be Diagnosed Through a Shirt?—*The Medical Examiner and General Practitioner*, April, 1900.

HUNTER ROBB, M. D. A Clinical and Pathological Report of Two Cases of Genital Tuberculosis.—*Cleveland Medical Gazette*, March, 1900.

THOMAS R. BROWN, M. D. Cystitis due to the Typhoid Bacillus Introduced by Catheter in a Patient not Having Typhoid Fever.—*Medical Record*, March 10, 1900.

JOHN G. CLARK. Two Cases of Extranterine Pregnancy.—*American Journal of Obstetrics*, April, 1900.

HENRY C. COE, M. D. Pain as a Pathognomonic Symptom of Ectopic Pregnancy.—*Medical News*, April 21, 1900.

WILLIAM OSLER, M. D., and THOMAS MCCRAE, M. B. (Tor.). Cancer of the Stomach in the Young.—*New York Medical Journal*, April 21, 1900.

SIMON FLEXNER, M. D., and LEWELLYS F. BARKER, M. D. Prevalent Diseases in the Philippines.—*Science*, April 6, 1900.

T. CASPAR GILCHRIST. Two Unusual Cases of Annular Syphilides in Negroes.—*Maryland Medical Journal*, April, 1900.

THOMAS R. BROWN, M. D. Cystitis Caused by the Bacillus Pyocyaneus. Progress in Medicine.—*Maryland Medical Journal*, May, 1900.

HARRY T. MARSHALL, M. D. A Study of Christian Science.—*Md. Med. Jour.*, May, 1900.

H. O. REIK, M. D. Some Interesting Cases of Mastoiditis.—*Md. Med. Jour.*, May, 1900.

ROBERT REULING, M. D. Pathology and Neurology.—*Md. Med. Jour.*, May, 1900.

HUGH H. YOUNG, M. D. Progress in Surgery.—*Md. Med. Jour.*, May, 1900.

NOTES ON NEW BOOKS.

Diseases of the Stomach. By JOHN C. HEMMETER, M. D., of Baltimore. (*P. Blakiston's Son & Co. Philadelphia*, 1900.)

This is the second edition of this work which originally appeared in 1897. To the first edition a number of illustrations and nearly one hundred pages have been added. The general plan of the work has not been changed. Among the new material the articles on Hypertrophic Stenosis of the Pylosus, Obstruction of the Orifices, and Hemorrhage from the Stomach are specially noticed. Recent work and literature have been carefully used. The bibliography given is a very valuable feature of the book, but many readers would prefer to have fewer references inserted in the text. In using the book we have often found the lack of orderly arrangement rather a drawback. The exact whereabouts of all the points on a given subject are often found with difficulty. The work has been found very useful and we congratulate Dr. Hemmeter on his second edition.

The Anatomy of the Brain. By RICHARD H. WHITEHEAD, M. D. (*The F. A. Davis Company*, 1900.)

This is a book of 96 pages which aims at giving a short and concise account of the anatomy of the brain without too many minor details. It is divided into four chapters dealing with the divisions, the surface anatomy, the internal anatomy and the conducting paths of the encephalon. The text is clear and the giving of the terms adopted by the German Anatomical Society in addition to those commonly used in this country is a helpful feature. The illustrations are good and are not too complicated. Altogether the work should be of great use especially to students, as it is probably the best short description of the brain that we have in English.

BOOKS RECEIVED.

Transactions of the College of Physicians of Philadelphia. Third series. Volume the Twenty-first. 1899. 8vo. XLVIII + 197 pages. Printed for the College. Philadelphia.

Proceedings of the Philadelphia County Medical Society. Vol. XX. Session of 1899. Joseph M. Spellissy, M. D., Editor. 1899. 8vo. XVIII + 368 pages. Printed for the Society, Philadelphia.

The British Guiana Medical Annual. Edited by J. F. S. Fowler, M. B. Eleventh year of issue. 1899. 8vo. 23 + XXXVII pages. Printed by Baldwin and Co., Georgetown, Demerara.

Injuries to the Eye in their Medico-legal Aspect. By S. Baudry, M. D. Translated from the Original by Alfred James Ostheimer, Jr., M. D. Revised and Edited by Charles A. Oliver, A. M., M. D. With an Adaptation of the Medico-legal Chapter to the Courts of the United States of America, by Charles Sinkler, Esq. 1900. 12mo. X + 161 pages. The F. A. Davis Co., Philadelphia, New York, Chicago.

The Medical Annual and Practitioner's Index. Eighteenth Year. 1900. 12mo. LXXX + 871 pages. John Wright & Co., Bristol.

The Pathology and Surgical Treatment of Tumors. By N. Senn, M. D., LL. D. Second edition, revised. Illustrated by 478 engravings, and 12 full-page plates in colors. 1900. 8vo. 718 pages. W. B. Saunders, Philadelphia.

Essentials of Diagnosis. Arranged in the form of Questions and Answers. Prepared especially for Students of Medicine. (Saunders' Question-Compends, No. 17). By Solomon Solis-Cohen, M. D., and Augustus A. Eshner, M. D. Second Edition, revised and enlarged. Illustrated. 1900. 12mo. 417 pages. W. B Saunders, Philadelphia.

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An Experimental Study of the Thyroid Gland of Dogs, with especial consideration of Hypertrophy of this Gland. By W. S. HALSTED, M. D.

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